Stakeholder Perspectives around Sustainable Development: a Q Methodology Study on 'Green Pioneers' in Ireland

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Chao-Ping (Pat) Hong

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Glossary of Terms in Q Methodology

Concourse

In the Q methodology study, concourse refers to a set of opinions around a topic. These set of opinions are presented in the form of Q statements in this study.

Crib Sheets

A systematic approach proposed by Watts & Stenner (2012) to assist the researcher interpret the factor analysis results in a holistic manner, by incorporating every single Q statements in the factor array. A crib sheet includes: Q statements with the highest ranking in this factor array; Q statements with the second highest ranking in this factor array; Q statements ranking higher in this factor array than in other factor array; Q statements ranking lower in this factor array than in other factor array; Q statements with the second lowest ranking in this factor array; Q statements with the lowest ranking in this factor array.

Eigenvalue

A measurement of how much information is captured in a factor (Kline 1994). The Kaiser-Guttman criterion indicates that eigenvalues less than 1.00 are often cut-off points for factor extraction (Guttman 1954; Kaiser 1960).

Factor analysis

A statistical method to examine latent factors. Researchers operates factor analysis to generate clusters of data sets (Kline 1994). In a Q methodology study, factor analysis is used to observe distinctive variables with the technique of correlations between Q sorts (van Exel and Graaf 2005).

Factor array

A diagram representing viewpoints of a factor after calculating the factor scores. A factor array illustrates how participants associated with that particular factor would administer the Q sorting process.

Factor loading(s)

A measurement of the association between each of the Q sort and a factor. In this study, factor loadings higher than 0.35 are considered statistically significant at the 0.01 level. This is calculated as: 2.58*standard error (SE); SE= $1 \div \sqrt{}$(number of statements)(McKeown & Thomas 1988). In this study, the factor loading is therefore: $2.58 \times 1 \div \sqrt{}55=0.347$.

Factor score(s)

A numerical measurement illustrating how a statement associate with each of the factors. The factor scores range from -5 to +5 in this study.

Inductive factorial design

The design for the selection of the Q statements in the Q methodology study is not structured by theories or guidelines. Instead, the patterns for selecting the Q statements emerge from the Q statements themselves (McKeown & Thomas 1988, pp.28-30).

P (Participant) sample

A group of selected participants to take part in the Q methodology study.

PQMethod

A free software package designed by Schmolck (2002) to run the factor analysis. In this study, the version of the software used is PQMethod 2.33.

Score Sheet

A diagram presenting how a Q sort should look like after each participant completes the Q sorting process. Each score sheet would have the number of the statements recorded in each cells corresponding to how the participants rank the statements. The researcher collects the score sheets, and enter the numbers into PQMethod for factor analysis.

Q methodology

A mixed-methods research approach which is explorative, interpretative and intensive. It suits studies with a small number of participants, and operates factor analysis for interpreting the study results (Brown 2008). There are several steps in carrying out a Q methodology study. First, the researcher presents the participants with a set of items (in forms of statements, pictures, audios, and etc) regarding a subject of study. A group of selected respondents then rank the items according to their preferences and individual viewpoints (Smith 2001; Brouwer 1999). The researcher then applies factor analysis to the rankings. The correlations between individuals illustrate similar viewpoints or subjectivities (van Exel 2005).

Q sort(ing)

A Q sort refers to the ranking of Q statements by a participant who follows the instructions from the researcher (free-distribution or forced-choice distribution). Q sorting refers to the action of sorting the Q statements from the concourse in the study, in the order according to participants' preferences. In this study, the Q sorting process refers to the ranking of 55 Q statements.

Q statement

A set of Q statements present the concourse of the subject of study. To administer the Q methodology study, it would be impossible to include hundreds of Q statements. Normally 40-60 Q statements are presented in Q methodology studies. In this study, 55 Q statements describe various perspectives regarding communication around sustainable development in Ireland.

Rotation methods

Both objective or subjective rotation methods have been applied in Q methodology studies to extract factors. With rotation methods, the perspectives of how the relationships between Q sorts are viewed will be shifted, providing the researcher with different insights to interpret the factor analysis results (van Exel & de Graaf 2005).

Study variance(s)

Study variance shows how much power a factor explains the results. A study variance is equal to the eigenvalue divided by the number of variates (number of participants) in the study. There are three types of study variances: common variance, specific variance, and error variance (Kline 1994).

Varimax rotation

A rotation method which offers orthogonal solutions, meaning that the factors are always at right angles to each other. Varimax rotation generates the highest associations between each Q sort with only one factor (Stricklin & Almeida 1999).

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Abstract

We are facing serious consequences from unsustainable human activities. Sustainable development is an ideal in which economic development meets our needs in the present without compromising the ability of future generations to meet their own needs (WCED 1987). Sustainable development entails environmental, political, economic and social factors. The 'wicked' problems in sustainable development are related to heterogeneous stakeholder perspectives, problematic definitions around sustainable development, imbalanced dimensions which lead to business-as-usual, as well as communication problems across a range of stakeholders. Studies have shown the necessity of identifying multidisciplinary stakeholder perspectives and developing effective stakeholder communication strategies to reach consensus on policy solutions around sustainable development.

Sustainable development is a significant issue in Ireland. Identifying modes of communication between disparate stakeholders in Ireland helps tease out perspectives around the most prevalent issues and solutions around sustainable development, and underpin effective communication to facilitate environmental policies. This study applies a mixed-methods approach, using Q methodology, an exploratory, intensive research methodology for constructing subjectivities with quantitative factor analysis and qualitative interpretations, to underpin perspectives from Irish 'green pioneers'- stakeholders who are already engaged in sustainable development. The literature around stakeholder communication in sustainable development as well as nine semi-structured interviews generate a concourse of 55 Q statements. In the main Q methodology study, 28 participants from local authorities, NGOs, green businesses, and research institutions, are invited to rank the 55 Q statements according to their preferences. The factor analysis results show a typology of six distinct perspectives around sustainable development in Ireland. These perspectives are shared modes of engagement rather than corresponding to specific stakeholder types, illustrating the need for heterogeneous stakeholder communication. This study also translates cutting-edge thinking of experts and primary analysis into practical outputs: requirements for a communication toolkit for stakeholders to communicate and strategize around sustainable development.

Chapter 1 Introduction

Humanity is facing serious consequences from unsustainable activities. Enlightenment thinking which emphasizes on the importance of the human intellect has been misused in legitimating the exploitation of nature to achieve industrialization (Kelly et al. 2007; Sneddon et al. 2006). Rapid increases of population along with tremendous industrial growth since the 1900s accelerates pollution, deforestation and loss of biodiversity. During the 1960s and 1970s the concept of sustainable development emerged, presenting an ideal in which economic development meets needs in the present without compromising the ability of future generations to meet their own needs (WCED 1987). At that time, environmentalists were interested in economic growth and the applications of scientific knowledge in the acquisition of renewable energies to prevent serious consequences for humanity and life on Earth (Reid 1995, pp.3-4):

> A considerable amount of evidence is now available to prove that if unsustainable development continues, it will be at the cost of even greater human suffering worldwide, and will create even more serious and pervasive ecological damage to the biosphere.

Recent studies in sustainable development reveal the contested and 'wicked' nature of sustainable development despite various attempts to define its constitutions (Redclift 2005; Reid 1995). Reid (1995) further claims that the term 'sustainable development' refers to a range of overlapping and conflicting associations. Achieving sustainable development requires mitigating environmental, societal and economic risks (Raven et al. 2009; Barry 2007; Voinov 2007; van Eijndhoven 1995; Rittel & Webber 1973). These heterogenous risks and effects on society call for multidisciplinary approaches to address relationships between political, economic and social factors in environmental issues (FitzGibbon & Mensah 2012; Hopwood et al. 2005). Since uncertainties in science and technology as well as diverse, conflicting values contribute to complex ecological and environmental issues, there are dissensus among stakeholders regarding policy objectives and solutions to tackle these complex issues (Cuppen et al. 2010). Better decision-making tools could help inform policy makers and stakeholders on complex issues in the environment and development, aiding environmental decision-making, governance and regulations (Barry 2012; Curry et al. 2012;

Frantzi et al. 2009). Regarding complex issues in sustainability, Curry et al. (2012, p.1) point out that there are benefits in understanding the perspectives of stakeholders from all economy and society sectors:

> Identifying discourses within and across different sustainability stakeholders (viewed as more or less coherent ways that people understand a specific issue) can aid progress in developing and implementing sustainability and resource management policies, through identifying barriers to, or potential alignments with, policy.

More attention should be given to sustainable development in the world's policy agenda (Hopwood et al. 2005). Sustainable development initiatives are also more likely to succeed when they have stakeholder consensus on green approaches, which requires effective communication. The OECD (2002) has also said that bringing in heterogenous, disparate perspectives could help strengthen knowledge capacity, and so facilitate coordination of the groups to reach consensus on environmental policies. Communication analysis also contributes to consensus building by showing how stakeholders shape the environmental decision-making process (Reed et al. 2009), and by mapping out conflicting agendas (Rittel & Webber 1973), social interactions between stakeholders (Lehtonen 2004), and social debates in science and developments (van Eijndhoven 1995).

Past studies have been carried out to examine the perspectives of stakeholders regarding complex issues in sustainability, using discourse analysis, mapping and framework analysis (Horn & Weber 2007; Hopwood et al. 2005; Sneddon et al. 2005), stakeholder analysis (Cots 2011; Roberts 2000; Mitchell & Wood 1997; Donaldson & Preston 1995; Freeman 1984), evaluation studies (Weigold 2001; Ward et al. 2008), case studies (Vifell & Soneryd 2012; Coelho et al. 2010) and focus groups (Ricci et al. 2010), interviews (FitzGibbon & Mensah 2012; Cuthill 2002; Wilkinson et al. 2011), quantitative studies (Jansson & Biel 2011) and Q methodology (Cairns 2012; Curry et al. 2012; Cuppen et al. 2010; Ellis et al. 2007; Breukers 2006; Niemeyer et al. 2005; van Eeten 2001; Barry & Proops 1999). Among various research methodologies and analyses, Q methodology has been signalled out for being especially beneficial in teasing out the viewpoints of stakeholders in environmental policy analyses (Cuppen et al. 2010; Ellis et al. 2007; Breukers 2006; van Eeten 2001), as well as providing analytical, multi-dimensional approaches to examine subjectives in a reliable and replicable manner (Davis & Michelle 2011; Schrøder & Kobbernagel 2010; Donner 2001; Brown 1994).

To sum up, underpinning stakeholder perspectives around sustainable development contributes to the investigation of heterogeneous risks and effects on society from political, economic and social factors (FitzGibbon & Mensah 2012; Cuppen et al. 2010; Reed et al. 2009; Starks & Trinidad 2007; Hopwood et al. 2005). Q methodology is a suitable research method to tease out how multidisciplinary stakeholder perspectives construct the most prevalent issues and solutions around sustainable development. In this study[1], we have chosen Q methodology as our research method. We will further elaborate on this methodology in the methodological design chapter (see Chapter 3).

1.1 Sustainable development in Ireland[2]

Sustainable development is a significant issue in Ireland. Prior to 2000, Ireland had insufficient infrastructures, unsustainable consumption patterns due to rapid economic growth, and limited use of economic instruments to curb the consumption, for example water charges for households (OECD 2000b) which are only now being introduced[3]. Since 2000, however, Ireland has significantly improved its environmental policies, institutions, and infrastructure, reduced the carbon-intensity of its economy, and improved the quality of its air and water (OECD 2009, Chapter 1, p.5). In 2003, The Environmental Enforcement Network was established, coordinating cross sectoral knowledge exchange and administrations (ibid.). Non-governmental and multi-sector collaborations to achieve sustainable development include innovative green businesses such as *The Green Way*, a collaborative cleantech initiative in Dublin[4] (Knowles et al. 2012; Ernst & Young 2011) and

[1] The main author of this study, Chao-Ping (Pat) Hong, is originally from Taiwan. Being a non-Irish researcher gives her an advantage to identify and examine stakeholder perspectives in Ireland with more objective, unbiased manners. Her multidisciplinary background (B.A in engineering in National Taiwan University; Masters in science communication conducted at Delft University of Technology in the Netherlands) inspired her to conduct this PhD with a mixed-methods approach using quantitative as well as qualitative analysis. She is also part of the Celsius research group at Dublin City University. http://www.dcu.ie/communications/celsius/index.shtml

[2] In this study ireland refers to The Republic of Ireland.

[3] "Water charges - Dublin - Citizens Information." 2010. 12 Nov. 2014 http://www.citizensinformation.ie/en/environment/water_services/water_charges.html

[4] An tSli Ghlas- *The Green Way* -is a green economic corridor initiated by an alliance of Cleantech businesses, academic institutions and local authorities in Dublin region. It was formed to drive Ireland and Dublin's innovation and productivity by applying the core competencies of the cluster, which includes education, R&D, procurement and enterprise, with the initial focus on energy efficiency There are four core areas representing the Cleantech industry, namely renewable energy, energy efficiency, environmental services and water management (Ernst & Young 2011). ''As future economic, financial and social paradigms

resilience movements like the Cloughjordan Ecovillage[5]. There have been ''numerous environmental campaigns and green awards, such as Tidy Towns, Green Flags and the Race Against Waste, which have stimulated environmental awareness and initiatives at national and local level'' (OECD 2009, p.16). Ireland is on its way towards sustainability, despite contested challenges (A Framework of Sustainable Development for Ireland 2011, p.65):

> Some aspects of the pattern of development that emerged in Ireland over the last decade present major challenges from a sustainable development perspective. While such patterns are the output of the interaction of economic, social and geographical influences going back several decades, efforts are now underway to better steer future development on a more sustainable path learning from the lessons of the past.

Environmental concerns in Ireland no longer exist in extreme political views, but rather have become manifested into people's daily life and normal politics (Kelly et al. 2007). The environmental movements in Ireland are quite informal and egalitarian, which are rather different from those in the environmental movements literature (ibid.). The goals and objectives of these movements are also very diverse, showing a wide range of understanding and concerns for environmental issues (ibid.). However, the participation of environmental NGOs in decision-making in Ireland has been relatively low, which may reflect badly on how environmental sustainability is incorporated in the national development plan (OECD 2009). It is argued that Ireland should ''promote broader participation by NGOs and relevant public organisations in the development and implementation of national and local development policies, programmes and projects'' (ibid., p.17). It was also pointed out that Ireland needs to readdress ''policies that are both economically costly and environmentally damaging"(A Framework for Sustainable Development for Ireland 2011, p.12) . The report (ibid., p.22) also points out that businesses in Ireland need to take into account sustainable development considerations into economic decision.

Regarding achieving the environmental dimension of sustainable development in Ireland, transport, water treatment, pollution problems, biodiversity, and energy efficiency are the most important themes (OECD 2009; OECD 2000b). Studies have been carried out to

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evolve, inventive Ireland gears up to new challenges and offers vibrant possibilities for growth'' (IDA Ireland). http://www.thegreenway.ie/

[5] "Sustainable Projects Ireland." 19 Nov. 2014 http://www.thevillage.ie/

evaluate Irish emissions and resource use in order to seek alternative policy scenarios and project policy options into the future. For example, a STRIVE project carried out by The Environmental Protection Agency (2007) examines greenhouse gas emissions and waste with the application of a sustainable development model for Ireland. On the other hand, there are also efforts towards achieving the social dimensions in sustainable development. For example, several themes around the social dimensions in sustainable development have been addressed, including equity between generations and regions, cultural heritage, and diversity (A Framework of Sustainable Development for Ireland 2011, p.12). The report (ibid., p.21) also mentions Ireland's opportunity for driving collective stakeholder efforts to achieve desirable sustainable development objectives. One of the objectives of the framework is to ensure effective governance mechanisms across different sectors and enhance participation of stakeholders. Key players such as business, community-based organizations and other civil-society groups could generate a sophisticated set of well-connected structures and interlinkages (ibid.).

Regarding the public's engagement with sustainable development in Ireland, there has been increasing public concerns regarding global environmental impacts , such as climate change and the world's rising temperature (Kelly et al. 2007). However, there is little change in public's knowledge of science, and actualizing environmental behaviours have been slow, especially ''in terms of political behaviour, formal activism of any kind remained rare" (ibid., p.3). Providing better information and developing measures in the sustainability dimensions (i.e. energy, infrastructure) in Ireland, alongside mobilizing more supports and actions across sectors and society, could strengthen engagement from individuals and consumers (A Framework of Sustainable Development for Ireland 2012, p.22). OECD (2009, p.5) also concludes that Ireland should ratify the ''Aarhus Convention[6] on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters''.

However, compared to other European countries, Ireland seems to be a latecomer to debates and political solutions around sustainability. For example, the Irish Environmental Protection Agency states that there is lack of integrated environmental policies across sectors in Ireland (Environmental Protection Agency 2007). There is ''a lack of clarity regarding the elaboration of the policy objectives of community and local development

[6] "The Aarhus Convention - European Commission." 2006. 14 Nov. 2014 <http://ec.europa.eu/environment/aarhus/>

programmes'' (The Framework of Sustainable Development 2012, p.42). The report (ibid.) questions whether Ireland can recover fully from its serious fiscal and economic crisis. Furthermore, the Irish National Economic & Social Council (NESC) responds (2012) to the report (ibid., p.9) by discussing the implications of involving various actors in the policy process of sustainable development:

> Sometimes it will involve 'creative ambiguity' which creates a problem solving process. In other contexts, the outcome will be the lowest common denominator of what all can agree. These possibilities highlight the fact that in a great many policy spheres, the role played by central government is critical in shaping the way in which diverse actors and interests interact with one another.

The strategic approach of Ireland's sustainable development has been applied in ''securing the transition, over time, to an environmentally sustainable society and economy'' (Government of Ireland 1997, p.20). To translate the abstract concepts around sustainable development into meaningful actions, 55 indicators under four major domains (Global Indicators, Economy, Social, Environment) are developed by the CSO (Central Statistics Office) in 2013. These indicators respond to the integrative approach of the three core pillars ,where sustainable development is about achieving ''economic stability based on a model of national progress and development that respects the three core pillars of sustainability: the environment, the economic, and the social'' (A Framework of Sustainable Development for Ireland 2011, p.10). As stated in the Framework report (ibid.), the challenge is to mobilize citizens towards protecting the environment in collaboration with social and economic progresses. These reports mentioned above show that while Ireland maintains the traditional Brundtland's definition of sustainable development and focuses on the three pillars (environmental, economic, social) rather than adopting new concepts, the indicators nevertheless offer a snapshot of where Ireland stands in the worldwide perspectives of sustainable development.

However, more research around sustainability and the environment is needed in Ireland to inform policy makers and various stakeholders regarding making environmentally relevant decisions (Kelly et al. 2007, p.21). Ireland needs to develop a 'Communication and Research plan' to introduce societal changes and the implications of achieving sustainable development, as well as mapping out key stakeholders to outline challenges and

opportunities for the transition towards a sustainable society, which ''will be linked to the development of Resource Efficiency policies and strategies and the encouragement of behavioural change'' (A Framework of Sustainable Development for Ireland 2011, p.52). Communication around sustainable development is needed to investigate the relationships between key participants, and ensure that strategies are built on existing frameworks and policies (Strategic Communication for Sustainable Development 2006, p.15). OECD (2002a, p.28) further points out that besides the involvement from the state, multi-stakeholder processes involving decentralised authorities, the private sector and civil society, as well as marginalised groups are crucial to ensure engagement and drive participation in sustainable development:

> Broad participation helps to open up debate to new ideas and sources of information; expose issues that need to be addressed; enable problems, needs and preferences to be expressed; identify the capabilities required to address them;and develop a consensus on the need for action that leads to better implementation.

By reviewing the status of sustainable development in Ireland over the past few decades, it seems that Ireland needs more studies to investigate communication among stakeholders to underpin engagement and participation in problem identifications for sustainability dimensions, while integrating environmental concerns into political and economic decisions (OECD 2009) and ensuring a ''country-driven, capacity-enhancing participatory processes that reflect the priorities of stakeholders'' (OECD, 2002a, p.17). Although many scholars have outlined a broad range of environmental viewpoints (Hopwood et al. 2005), there remain insufficient studies towards mapping out various stakeholder perspectives. A stakeholder communication analysis could help tease out the perspectives of stakeholders to collaboratively strategize solutions around the environmental, economic and social aspects in sustainable development. In our study, the key focus is to investigate the 'green pioneers'-stakeholders who are already engaged in sustainable development in Ireland. We aim to identify the most prevalent perspectives regarding sustainable development among these stakeholders in Ireland, and study how modes of communication between disparate perspectives contribute to the discussions around sustainable development.

1.2 Objectives and research questions in this study

The major objective of the study is to: identify stakeholder perspectives among 'green pioneers' regarding communication around sustainable development in Ireland. We also identify two secondary objectives:

1. Investigate how a communication analysis using mixed-methods study with Q methodology contribute to disparate perspectives among 'green pioneers' around sustainable development in Ireland.
2. Draw up requirements for a communication toolkit with guidelines for 'green pioneers around sustainable development in Ireland (see Appendix A).

For our research questions in this study, we ask:

- How would modes of communication between disparate perspectives contribute to the discussions around sustainable development among stakeholders in Ireland?
- How could a stakeholder communication analysis contribute to complex political, economic and social factors in sustainable development in Ireland?
- How would stakeholders respond to the stakeholder communication analysis around sustainable development?

To answer the questions above, we also need to ask:

- What are the most prevalent stakeholder perspectives among the 'green pioneers' regarding sustainable development in Ireland?
- Furthermore, what would be the requirements for a communication toolkit for 'green pioneers' around sustainable development in Ireland?

To answer these research questions, this study examines perspectives around sustainable development in Ireland with the aim to investigate modes of stakeholder communication applicable in addressing the most current political, economic and social factors associated with sustainable development in Ireland. In this study, we will also investigate requirements which could contribute to the design of a communication toolkit among stakeholders to illustrate how we could translate the empirical analysis and discussions around sustainable development into practical outputs for practitioners in the broad areas of sustainable development. Although the toolkit is not included in the main chapters, we would like to

emphasize the huge potentials involved with further elaboration of the toolkit and its impacts on stakeholder communication around sustainable development (see Appendix A).

1.3 Thesis structure

This section provides a synopsis for each of the remaining chapters in this study.

1.3.1 Chapter 2: Literature review

Chapter 2 discusses the state of research around sustainable development and how concepts across heterogeneous stakeholder communication contribute to discussions around sustainable development. The chapter is structured with questions in the headings to address the following themes in the literature: how the wickedness of sustainable development relate to stakeholder communication issues, existing efforts in achieving sustainable development, and the contributions of stakeholder communication in sustainable development.

1.3.2 Chapter 3: Research Design

Chapter 3 begins by giving an overview of research methods used in previous studies regarding communication around sustainable development, and justifies our selected methodological design of this study: a mixed-methods approach to carry out Q methodology, which is an explorative research methodology to investigate subjectivities of participants with the operation of factor analysis. The mixed-methods design includes nine semi-structured interviews with 'green pioneers', an inductive factorial design for Q concourse, the administration of the Q methodology study, the design of an evaluation study to investigate participants' feedback on the Q methodology study results, and the requirements of a stakeholder communication toolkit (see Appendix A). The chapter also describes in detail the steps of administering the Q methodology study, which includes a Q concourse selection, a (P)Participants sample selection, a Q sorting process for the participants, post-sorting interviews, and factor analysis. The strengths and weaknesses of the methodology design for our study is also discussed in this chapter.

1.3.3 Chapter 4: Stakeholder Communication around Sustainable Development in Ireland: findings from semi-structured interviews with 'green pioneers'

Chapter 4 presents the results from nine semi-structured interviews with 'green pioneers', by examining: how stakeholders regard the broad definitions of sustainable development; the diversity of stakeholder agendas around sustainable development in Ireland; stakeholder perspectives on an Irish sustainable development- *The Green Way*; multiple challenges in Ireland to achieve sustainable development; the status of communication around sustainable development in Ireland. The chapter concludes with discussions on the overall findings from the semi-structured interviews, how they respond to the literature around sustainable development, and how these findings contribute to the material for the Q concourse building, elaborated in Chapter 5.

1.3.4 Chapter 5: Inductive Factorial Design for the Q Concourse

Chapter 5 presents the Q concourse for our Q methodology study, with an inductive factorial design. Both the literature review (Chapter 2) and the analysis & findings of the semi-structured interviews (Chapter 4) inform the preselection of a Q concourse, which consists of a collection of Q statements. The inductive factorial design refers to the generation of a Q concourse by observing patterns emerged from the collection of Q statements rather than using pre-existing theories or categories to inform the selection of the Q statements (McKeown & Thomas 1988; Stephenson 1953). This chapter presents the categories and subcategories emerged from the preselected Q statements, as well as associations between the subcategories to generate theoretical codes. The final selection of the Q concourse is included at the end of this chapter.

1.3.5 Chapter 6: Methodology Study: Factor Analysis Results and Discussions

Chapter 6 presents the quantitative results from the factor analysis, using PQMethod 2.33, a free software package specially designed by Schmolck (2002) for running factor analysis for Q methodology studies. Detailed statistical results are presented with interpretations for four-, five-, and six-factor solutions. The chapter concludes with discussions on selecting the final factor solution for our Q methodology study, examining how four-, five-, and six-factor solution provide optimal quantitative results as well as how these factor solutions tease out

the qualitative perspectives regarding communication around sustainable development in Ireland. The six-factor solution is selected as the final factor solution for our study.

1.3.6 Chapter 7: Q Methodology Study: Six Types of Perspectives around Sustainable Development in Ireland

Chapter 7 interprets and discuss qualitatively the six-factor solution from the final solution selected from the quantitative factor analysis. The chapter also discusses the implications of these factors and how they contribute to communication around sustainable development in Ireland, the similarities and differences among the six factors, and the opportunities and challenges regarding stakeholder communication among these perspectives. Participants' feedback on the Q methodology study results are also presented to discuss the representativeness of our study. Chapter 7 concludes with the limitations of our Q methodology study by examining limitations in the Q concourse selection, P sample selection, the researcher's bias and the validity of our Q methodology study.

1.3.7 Chapter 8: Conclusions and Recommendations

Chapter 8 discusses the overall findings regarding stakeholder communication around sustainable development in Ireland. The conclusion chapter also addresses the research questions raised in this chapter regarding: modes of communication between disparate perspectives around sustainable development; the role of a mixed-methods communication analysis in sustainable development; stakeholder responses to the study and the design requirements of a stakeholder communication toolkit. Chapter 8 concludes with contributions to both research and practice in the area of sustainable development, as well as recommendations for future research.

Chapter 2 Literature Review

Sneddon et al. (2006, p.254) point out that ''the call for sustainable development was a redirection of the enlightenment project, a pragmatic response to the problems of the times''. The notion of sustainable development entails environmental, social and economic pillars, as well as the consideration of long-term impacts of different activities (Vifell & Soneryd 2012). As inequalities in accessing economic opportunities increased, managing social and environmental goals in most societies have been increasingly challenging (Sneddon et al. 2006). Hopwood et al. (2005, p.38) points out that the concept of sustainable development is crucial in the sense that it brought upon an ''important shift in understanding relationships of humanity with nature and between people''. Although there have been many different meanings and responses to the concept of sustainable development (ibid.), the most cited and widespread definition of sustainable development is in the Brundtland report (WCED 1987, p.43): ''sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.''

However, the nature of sustainable development is disputed and highly associated with how stakeholders perceive and communicate the issues. Sustainable development entails wicked problems (Cuppen et al. 2010; Redclift 2005; Reid 1995; Rittel and Webber, 1973). Despite current efforts in sustainable development, including a critical re-examination of the the business-as-usual model, enhancing public participation and engagement via deliberative democracy, or implementing ecological modernisation, identifying stakeholder perspectives is crucial in teasing out the disputed debates around sustainable development (Curry et al. 2012; Ellis et al. 2007; Fontaine et al. 2006; Barry & Proops 1999). To explore the literature around the contested nature of sustainable development and how relevant stakeholders regard these issues, the literature review[7] in this chapter consists of three major sections:

- Issues around stakeholder communication around sustainable development
- The current efforts and discussions around sustainable development

[7]The literature review chapter provides a snapshot of the current state of research in stakeholder communication around sustainable development and identifies gaps in the research. The methodological designs of studies in stakeholder communication around sustainable development are not included in this chapter, but discussed later in Chapter 3 (see 3.1).

- The contribution of stakeholder communication in sustainable development

Section 2.1 examines the heterogeneity of stakeholder perspectives around sustainable development, which often result in low consensus and contradicting stakeholder agendas (Cuppen et al. 2010; Frantzi et al. 2009; Kate et al. 2005; Meppem & Gill 1998), the fragmentation of stakeholders (Roberts 2000; Carley & Christie 1992, p.71) as well as misleading communication messages around sustainability (Cooper & van der Vorst 1997). Defining sustainable development is problematic (Barry 2007; Hopwood & Mellor & O'Brien 2005; Lehtonen 2004; Clark & Dickson 2003; Parris & Kate 2003). The interpretation for sustainable development is extremely open and abstract (Barry 2007; Parris & Kate 2003), which ranges from deep concerns for human existence on the planet to the abandonment of relationship between humans and the environment (Hopwood et al. 2005). The various discourses around sustainable development definitions indicate that the traditional definition of sustainable development by Brundtland (1987) is merely an oxymoron, and leads to business-as-usual (van Passel 2008; Redclift 2005; Sneddon et al. 2006; Parris & Kate 2003). The complex dimensions in sustainable development are also associated with stakeholder communication. There are imbalances in sustainable development dimensions, where the societal dimension remains marginal in discussions around sustainability (Vifell & Sonergd 2012; Rittel & Webber 2010; Barry 2007; Lehtonen 2004; Norgaard 1988). The current political systems adopt an economic-driven agenda (IPCC 2013; Levin et al. 2009; Barry 2007; Reid 1995, p.29) as well as instrumental, technologically-driven agenda (De Haan 2011; Levidow & Marris 2001) which leads to business-as-usual in the attempt to achieve sustainable development. Studies have shown two main different communication approaches to address the imbalances in sustainable development, including systemic approaches to facilitate and coordinate national and international policies and goals (Barry 2007; Lehtonen 2004; Carvalho 2001; Rittel & Webber 1973), as well as the call for more efforts in stakeholder engagement from bottom-up and ground levels (Kate et al. 2005; Reid 1995). However, in our study, we do not advocate or favour particular approaches, but aim to observe and extract what participants regarded as most salient issues in communication around sustainable development.

Section 2.2 reviews the literature around current efforts in sustainable development. The status quo perspective, namely adopting a political business-as-usual economic system (Freedman 2012; Reid 1995), would not allow us to achieve the targets laid down by

sustainable development policies (Kelly et al. 2007; Sneddon et al. 2006; Carvalho 2001). The business-as-usual discourse is further discussed in section 2.2.1. Section 2.2.2 discusses changes needed in the political and economic agenda (IPCC 2013; Barry 2012; Barry 2007), with more inclusive public participation in sustainability (OECD 2009; Craig 2007; Miller 2001; van Eijndhoven 1995). Section 2.2.3 discusses efforts in technological innovations such as Cleantech to induce new lifestyles changes (OECD 2014; GCII 2012; Ernst & Young 2011; van Passel 2008; Clift 1997), and also address the dangers of adopting technocratic solutions resulting in embracing the status quo (Freed man 2012; Meppem & Gill 1998; Reid 1995, p.44). The literature also signals the weaknesses in the three pillars (environmental, societal, economic) in sustainable development debates (Vifell & Soneryd 2012; Lehtonen 2004; Cuthill 2002), as well as various other dimensions necessary for achieving sustainable development (Barry 2007; Redclift 2005; Lehtonen 2004; Parris & Kate 2003).

Section 2.3 discusses how identifying stakeholder perspectives in sustainability contributes to environmental policy-making (FitzGibbon & Mensah 2012; Reed et al. 2009; Starks & Trinidad 2007; Cuthill 2002). Various studies have applied Q methodology to identify stakeholder perspectives in sustainability (Curry et al. 2012; Cuppen et al. 2010; Frantzi et al. 2009; Niemeyer et al. 2005). Multidisciplinary approaches in stakeholder communication contribute to knowledge and social learning (Cots 2011; Cuppen 2010; Ahmed & Stein 2004; OECD 2002; Roberts 2000), as well as scientific knowledge (Cash et al. 2003; Levidow & Mavis 2001; Miller 2001) and consensus building (Logan 2001). To achieve sustainability, collaborations from multidisciplinary stakeholders are needed (Frantzi et al. 2009; Macnaghten et al. 2005; Donner 2001). The literature also reveal the importance of stakeholder communication strategies and the criteria of effective strategies (Kate et al. 2005; van Dijck 2003; OECD 2002), the importance of accommodating stakeholder perspectives in communicating complex scientific issues (Cuppen et al. 2010; Craig 2007; Vicente & Partidário 2006; van Eijndhoven 1995), as well as the various strategies for effective stakeholder interactions and collaborations (Jackson 2005; Cash et al. 2003; Miller 2001). The literature also identifies various stakeholder communication strategies for consensus building in complex issues (Roberts 2000), as well as the challenges in stakeholder communications strategies (Hopwood et al. 2005; Roberts 2000).

2.1 Issues around stakeholder communication around sustainable development

Cuppen et al. (2010, p.579) point out that problems related to the environment and sustainability are often 'wicked' (Rittel and Webber, 1973), 'messy' (Ackhoff 1974) and 'unstructured' (Hisschemöller & Hoppe 2001; Hisschemöller 1993). According to Reid (1995, p.12) , ''not only are problems linked in complex ways, but they change even as their contexts are changing. These connections may not always be very obvious or easy to trace''. Stakeholder communication are related to wicked problems in sustainable development (FitzGibbon & Mensah 2012; Cuppen et al. 2010; Frantzi et al. 2009). Wicked problems are resilient to analysis and to resolution (Horn & Weber 2007). Our awareness of wicked problems started to take shape in the 1960s and 1970s when societies continue to develop. Roberts (2000) argues that wicked problems are challenging because we are unable to solve it with traditional problem solving methods. Roberts (ibid., p.2) further explains the roots of complexity for wicked problems:

> Perhaps the expansion of democracy, market economies, privatization, travel and social exchanges highlight value differences and thus promote dissensus rather than consensus in the problem solving process. Perhaps the technological and information revolutions enable more people to become active participants in problem solving, and in so doing, increase the complexity of the process. Perhaps the ideological shifts in policy and management that encourage organizational decentralization, experimentation, flexibility, and innovation weaken traditional authority and control mechanisms that heretofore have keep a lid on conflicts.

Freeman (1984) describes a stakeholders as ''any group or individual who can affect or is affected by the achievement of the organization's objectives''. Cuppen et al. (2010, p.579) define stakeholder as ''an actor involved in, affected by, knowledgeable of, or having relevant expertise or experience on the issue at stake''. They also refer stakeholders to various actors, such as academia, government, policy makers, business and NGOs (ibid.). Van Dijck (2003) argues that Freeman's (1984) definitions do not offer a heterogeneous approach in addressing and acknowledging social and political aspects of dynamics between stakeholders' cultures. Van Eijndhoven (1995) also argues that the quality of opinion-forming

process in the discussions of complex scientific issues is too low, and that there is too little interactions between the parties at critical junctions, since conversations and discussions are confined to only a few groups. Cuppen et al. (2010) proposes that stakeholder communication in the forms of stakeholder participation and stakeholder dialogues are needed to improve how different stakeholders perceive and understand complex environmental problems in order to define the problems and potential solutions. Curry et al. (2012) further argue that understanding stakeholder perspectives around sustainability contribute to environmental policy developments.

To investigate how the wickedness of sustainable development relate to stakeholder communication, the following sub-sections discuss the literature around the heterogeneity of stakeholder perspectives, problems in defining sustainable development, and imbalances in sustainable development dimensions.

2.1.1 Heterogeneity of stakeholder perspectives

The heterogeneity of stakeholder perspectives contribute to wicked problems in the environment (Cuppen et al. 2010). Reid (1995, p.15) comments that sustainable development issues are usually represented by powerful forces in different guises. *Strategic Communication in Sustainable Development* (2006) also points out that one of the challenges in communication around sustainable development issues is that human behaviours are unpredictable. Kate et al. (2005) argue that challenges in sustainable development are heterogeneous and it is common to find that values and goals of diverse stakeholders contradict each other. For example, Frantzi et al. (2009) point out that it is difficult to evaluate the international environmental regime due to stakeholders having different criteria for achieving sustainability. Meppem & Gill (1998) also think that there exists minimal consensus regarding development policies. The lack of stakeholders' consensus is most evident when socio-cultural and environmental perspectives collide (ibid). Empirical studies have shown the deficits in communication around the perception and assessment of environmental issues, especially when different values are not clearly discussed during the communication process (Vicente & Partidário 2006). There are difficulties in effective communication between the community of experts and the

community of decision makers due to very different norms and expectations (Cash et al. 2003).

Cuppen et al. (2010, p.589) discuss the implications of heterogeneous stakeholder communication around environmental issues, saying that ‘’an extensive preparation phase is necessary to identify stakeholders, to identify the diversity of perspectives, and to conduct the stakeholder selection process.’’ Another challenge in heterogeneity of stakeholder perspectives in sustainable development is that different stakeholder groups use the same words to express different ideas, which are incompatible and leads to misunderstanding between stakeholders (Cooper & van der Vorst 1997). Media catchwords on sustainability-related topics also tend to be too simple and misleading, and therefore do not provide meaningful insights for policy making process (Berggren 1999). Yet another challenge of stakeholder communication in wicked problems is that wicked problems could result in serious divide of stakeholders (Roberts 2000). Compartmentalization of disciplines result in low quality of communication, since sectors have divergent and competing goals (Carley & Christie 1992, p.71). The lack of collaborative efforts among stakeholders in wicked problems might lead to the fragmentation of stakeholders’ perspectives that in turn worsen the complex interconnections of ‘wicked’ problems (FitzGibbon & Mensah 2012, p.1): ‘’the concept [wicked problems] is applied in organizational decision making as a ‘force of fragmentation’ whereby stakeholders polarize around their views of a problem, thereby undermining collaborative problem solving.” In addition, synergy in communication around wicked problems is harder to achieve when the number of stakeholders grow (Roberts 2000). Roberts (ibid, p.13) further points out the conflicts in stakeholder communication around wicked problems:

> Our diverse interests and perspectives become a curse when each stakeholder believes it holds ‘the truth’ and expects everyone to share it, or worse, when a stakeholder wants to impose his view of truth on others and considers anyone who refuses to accept it as dumb, ignorant, or morally deficient.

Nevertheless, studies have come up with different approaches to address the issues of heterogeneity of stakeholder perspectives in wicked environmental problems. Cuppen et al. (2010, p.579) argue that stakeholder dialogues are crucial in articulating values, interests, knowledge claims and underlying assumptions around complex environmental issues. Kim

(2007, p.306) states that successful collective efforts of stakeholders can ''result in the sharing of an agenda, preventing the too frequent loss of collective cognitive capability for problem solving or issue resolution''. FitzGibbon & Mensah (2012, p.2) further suggest that interdisciplinary approaches is essential to address these problems:

> Wicked problems are inherently complex in their scale of uncertainty and disagreement, as well as in their technical and social nature; therefore, they are best tackled by interdisciplinary approaches, coexistence of different knowledge systems, flexible governance, and participatory processes and practices that allow for adaptive learning and ethics.

Sneddon et al. (2006, p.254) also point out that multidisciplinary approaches would be fruitful in addressing complex issues in sustainability:

> Sustainability may yet be possible if sufficient numbers of scholars, practitioner and political actors embrace a plurality of approaches to and perspectives on sustainability, accept multiple interpretations and practices associated with an evolving concept of "development", and support a further opening up of local-to-global public spaces to debate and enact a politics of sustainability.

To sum up, the heterogeneity of stakeholder perspectives are associated with the wicked problems in sustainable development. Contradicting stakeholder agendas, the challenges in achieving consensus over sustainable development issues and solutions, as well as misunderstandings between various stakeholders and the fragmentation of stakeholders, are all characteristics of heterogeneity of stakeholder perspectives in sustainable development. Nevertheless, studies have suggested several stakeholder communication processes to deal with the heterogeneity of stakeholder perspectives, including stakeholder dialogues, collaborative interdisciplinary and multidisciplinary efforts. In our study, we aim to capture and tease out the heterogeneity of Irish stakeholder perspectives to get a more coherent understanding of sustainable development problems in Ireland. We also aim to investigate how stakeholder communication play a role in discourses around sustainable development. The literature around the contributions of stakeholder communication are elaborated further in section 2.3.

2.1.2 Problems in defining sustainable development

However, the definition of sustainable development has received over the years quite a few critiques. For example, Redclift (2005, p.213) argues that discourses around the definitions of sustainable development resulted from distinctive ontological positions, and that sustainable development problems demonstrate oxymoron characteristics: ''the simplicity of this approach is deceptive, and obscures underlying complexities and contradictions''. Redclift (ibid) then asks, how can developments be sustainable if natural resources are mobilized and sacrificed to achieve economic growth? Van Passel (2008) further points out that since existing definitions of sustainable development are elusive and contestable, they are very likely to be interpreted very differently by different stakeholders, or by present and future generations, all of which result in conflicting viewpoints even within the same sectors. Parris & Kate (2003) also question the inherent ambiguity of sustainable development concepts to address issues between the economy and the environment for the present and into the future. They point out that the oxymoron characteristic of sustainable development impede concrete forms of environmental policies and actions (ibid). On the other hand, Castro (2004) defends Brundtland's definition by pointing out that the Brundtland definition at least suggests a political compromise between growth and environmental sustainability. Sneddon et al. (2006, p.254) also regard the concept and practice of sustainable development being salient in addressing multiple global challenges and providing guidelines to institutional principles and concrete policy goals:

> Our Common Future (1987) marked, anchored, and guided the rise of a remarkable political debate, indeed a whole new political discourse across contesting interests, from grounded practitioners to philosophical academics, from indigenous peoples to multinational corporations.

However, Hopwood et al. (2005, p.40) criticises that the Brundtland definition is in danger of offering a business as usual model:

> Brundtland's ambiguity allows business and governments to be in favour of sustainability without any fundamental challenge to their present course, using Brundtland's support for rapid growth to justify the phrase 'sustainable growth'.

Nevertheless, Hopwood et al. (ibid.) do not deny the contribution of Brundtland's definition in addressing present and future fundamental challenges for humanity, including the relationship between people and environment, economic growth and inequity. However, Redclift (2005, p.13) points out that we are unable to bring sustainable development discussions into the future: ''sustainability as a mainstream concept had often disguised, in newer vestments, the conflicts and agendas of the past''. Despite their positive critique on WCED (1987), Sneddon et al. (2006, p.254) further point out the insufficient political efforts across the governments and citizens:

> The decline in equity and environmental quality since this report should certainly give pause to proponents and critics alike; the failure to stem the tide of unsustainable human activities can be linked to both ineffective institutions and a general lack of political will on the part of governments and citizens at multiples scales.

Parris & Kate (2003) also point out that sustainable development has 'broad appeal and little specificity'. Ecological consideration in the form of environmental preservation might only provide meaningless symbolic responses, where we continue to mobilize resources (Barry 2007). The other main issue from the abstractness of sustainable development definition is the inability to ensure global consensus on sustainability being applicable to local levels (Clark & Dickson 2003). In addition, the term 'sustainable development' hardly means anything to the general public. The public at large is not enthusiastic about scientific development issues and they are not active in participating in scientific debates (Eijndhoven 1995; Eurobarometer 2007). Schweizer et al. (2009) argue that when it comes to communication around scientific issues, messages from the scientists to the public should be highly related to cultural values and beliefs, linking people to traditions and experiences rather than abstract concepts of sustainability or scientific data. Hopwood & Mellor & O'Brien (2005, p.47) also mention the confusion of sustainable development concepts used in communication messages:

> Further confusion about sustainable development arises as people use the same words to mean a wide divergence of views on the goals, routes and the methods of moving towards sustainable development. This is further complicated because, as in many political issues, some people may say one thing and mean another.

To sum up on the problems of defining sustainable development, the traditional Brundtland definition of sustainable development has received quite a few critiques over its overly simplified statement and the oxymoronic nature of sustainable development. The literature also reveals that Brundtland's definition is contestable and leads the society towards a business-as-usual model. Existing accounts of sustainable development are too vague and abstract, which result in confusions in communication among stakeholders, and in turn are problematic to address the wicked problems in sustainable development. In our study, we aim to investigate how the Irish stakeholders (green pioneers) regard the issues around defining sustainable development and how communication manifests around producing more concrete and actionable impacts (see Chapter 4, section 4.1).

2.1.3 The imbalances in sustainable development dimensions

Stakeholder communication is also highly associated with complex dimensions in sustainable development (FitzGibbon & Mensah's 2012; Carley & Christie 1992, p.39). Vifell & Soneryd (2012, p.20) point out that although broad policy documents often present the three dimensions (environmental, economic, and societal) as compatible and mutually strengthening, in reality there are substantial conflicts between these dimensions. Lehtonen (2004, p.200) argues that the imbalances in sustainable development remain uncharted, and that ''even less attention has so far been paid to the linkages between the social and the environmental dimensions''. Barry (2007) also point out that the social sphere in the green political economy, which entails non-environmental set of principles and policy objectives, has received little attention. For Norgaard (1988), the cultural dimension remains one of the marginal aspects on the discussions around sustainable development. Rittel & Webber (2010, p.2690) further argue that In addressing the conflicting components in sustainable development, there's the danger of overlooking the human dimensions:

> Significant scientific and engineering challenges certainly need to be overcome, but the human dimensions of the technologies must also be considered. History reminds us that getting the science and technology right is not always enough to get new technologies adopted or used as intended. Neither is making them affordable. Some technologies fail because they involve siting facilities that people do not accept.

Barry (2007) states that the economic dimension is the most problematic dimension in sustainable development. Empirical studies around the effects of environmental quality on

economic growth still remain limited (López & Toman 2006). Levin et al. (2009) also point out that the current business-as-usual political systems occurs because immediate benefits are present, with the population besotted on maintaining the status quo. Reid (1995, p.129) further argues that policy efforts around sustainable development in Western countries have long been inadequate to address conflicted interests between development and environment:

> The most obvious obstacles to sustainable development- lack of awareness of the issues, the political unacceptability of 'obvious' steps forward, the opposition of entrenched interests, and the inadequacy of institutional mechanisms for integrating environment and development- reflect the direction and priorities of the development path followed by Western societies for many generations.

Despite the fact that there are interdependencies between economic growth and the natural environment (Voinov 2007), and that it is counter-productive to have ''a stand-alone environmental policy separate from economic development considerations'' (López & Toman 2006, pp.459), national authorities often in practice interpret sustainable development as merely economic development (IPCC 2013, Chapter 20). Van Eijndhoven (1995) thinks that this imbalanced emphasis on the economic dimension in sustainable development is probably due to the fact that framing sustainable development with economic arguments is much easier than accommodating complexities and consequences from evaluating and gauging developments in the areas of science and technology. Barry (2007, p.254) further points out the paradox of framing around economic security being more effective in policy communication than arguing for less growth and consumption:

> The point is that using the language and analysis of economic security is a more attractive and compelling way of arguing and presenting the case for a less growth oriented economy and consumption-oriented society and one that aims for putting quality of life at the heart of economic thinking and policy.

Barry (ibid) points out that sustainable development models which are based heavily on the economically and scientifically driven agenda could be huge impediments for societies to move towards sustainability. It is evident that growth models alone are not ideal approaches, since existing growth models have failed to eradicate poverty gap globally or within countries (Hopwood et al. 2005). Haque (2000) also states that the recent rapid economic expansions

contribute to interclass and international inequality. Wynne (2005) further points out that unless the challenge of incorporating cultural, social and technical factors into governance and regulation is taken seriously, the tensions in the technological transformation of democratic society are likely to remain latent.

Official discourses tend to systematically separate other discussions from science in order to reinforce the perception that science is value-free and neutral (Levidow & Marris 2001). However, Levidow & Marris (ibid) argue that this would ultimately result in the fact that science and technology are often used as merely an instrumental tool for drawing up policies, using dominant models of science to maintain the dichotomy of science and values. Carley & Christie (1992) also argue that we should not regard science as value-free if we wish to achieve sustainability, since discourses around science tend to only focus actively on uncertainties and risks, unearthing more questions in order to strategically generate 'solutions' (Schneider 2010). De Haan (2011) also points out that since societal needs are fulfilled by a complex interplay of interdependent systems, sustainable development is not only about innovations and technologies, or economic developments.

From the literature, there are also discussions around whether imbalances in sustainable development dimensions need to be addressed with more systemic and top-down political structures, or more specific focus on local sustainability and stakeholders. Communicating sustainability from a global perspective is undoubtedly different than from a regional perspective, argues Voinov (2007, p.499): ''we should be careful in selecting the systems that we wish to sustain. To sustain the global system we would need to sustain the functional subsystems''. Barry (2012) claims that there is an urgent need globally for the design and implementation of a meaningful set of sustainable development goals. Rittel & Webber (1973) also highlight the importance of incorporating holistic viewpoints in creating values for achieving sustainable development goals, and that environmental, social, and economic concerns need to be addressed in lieu, with resolution through a holistic perspective. Lehtonen (2004) emphasizes on the dynamics of the environmental-social interface in sustainable development through a framework of capabilities, social capitals and institutions. Olsen (2012) further points out that there should be more facilitations of national and international environmental policies and coordination. On the other hand, Kate et al. (2005)

argues for more focus on ground level stakeholder multi-agendas, which would be fundamentally different from a regional perspective.

Through an in-depth review over the last decade by examining structural context, historical processes and international institutions in sustainable development endeavours, Carvalho (2001) concludes that sustainable development is not achievable in the current political economy context, and that systemic changes are needed. However, Reid (1995) contributes the imbalances of sustainable development dimensions to top-down, rigid political approaches. He criticizes that the current political model is powerless to address smaller-scale problems such as regional sustainability, which require more consistent and engaging approaches with the public (ibid., p.231):

> Sustainable development cannot be imposed 'top-down', or implemented according to a blueprint in which the majority of the people have had no say. Instead it should evolve, growing organically from people's responses to the change in the world around them.

To sum up, there are disconnections between the environmental, economic, and societal dimensions in sustainable development. Existing sustainable development models are business-as-usual, which adopts economic and scientifically-driven agendas, while social and cultural aspects remain marginal in discussions around sustainable development. To address the imbalances in sustainable development dimensions, studies have pointed out various approaches such as systemic, top-down policies, as well as inclusive, ground level engagement processes. In our study, we neither advocate top-down, expert driven approaches in sustainable development or bottom-up approaches. The main goal is to extract what stakeholders regard as most appropriate and suitable approaches. In the case that both approaches are proposed (as shown in our analysis, see Chapter 7), we try to interpret the stakeholders' rationales and link supporting theories and literature to our analysis.

2.2 The current efforts and discussions around sustainable development

Sustainable development is a global trend on the political agenda, and receives much attention from policy makers, industry, the public and NGOs (Rave et al. 2009; Berggren 1999). Sneddon et al. (2006) point out that communication around the complex nature of mainstream sustainable development could be examined with an interplay of ecological, political, and economic discourses. Hopwood et al. (2005) also suggest that integrating environmental and socioeconomic issues could help map out the discourses in sustainable development. Over the past decade, researchers also focus on the development of newgrounds and models for the empowerment of public participation, engagement in science and its constraints (Kim 2007; Voinov 2007; Lawrence 2006; Swindall 2000; Tanner 1999; Farrington 1998), and also the lack of consideration for a holistic overview of dimensions in drawing up sustainable development approaches (Wynne 2005).

The following sub-sections present the current efforts in achieving sustainable development and discuss how they respond to the major viewpoints mapped out by Hopwood et al. (2005) for achieving sustainable development[8]: the business-as-usual model, public participation in sustainable development, the Cleantech perspective, the three pillars and other dimensions in sustainable development.

[8]Hopwood et al. (2005, p.42-46) proposes three major viewpoints to map out discourses around sustainable development: status quo, reform, and transformation. Supporters of the 'status quo' viewpoint identify change within an economic growth model. They perceive no conflicts between the growth of the global market and environmental stability. The 'reform' perspective argues that large shifts in policy and lifestyle are required within the present social and economic structures. Opposite from the status quo perspective, supporters of the 'reform' perspective argue that the 'business-as-usual' approach is a problem in achieving sustainable development. For the 'transformers', sustainable development problems are rooted in the economic and power structures within the society. Since sustainable development takes on a human-centred view of the inter-relations between environmental and socio-economic issues, some supporters of this viewpoint might not even be concerned with sustainable development. Those who agree with the notion of sustainable development, such as green activists, might not adopt similar vocabulary of sustainable development as adopted within the official and academic circles.

2.2.1 The business-as-usual model

The very idea of 'growth' leads to the business-as-usual model in sustainable development (Reid 1995). Despite attempts to incorporate multiple agendas in sustainable development, sustainable development is still viewed in the current paradigm as an ultimate issue of sustainable economic growth (Freedman 2012). Castro (2004) criticizes the United Nation's WCED (1987) definition of sustainable development, which he thinks is not far from plain old development. Hopwood et al. (2005, p.45) also state that the proposed details in the Brundtland report is leaning toward 'status quo'.

Despite efforts in Agenda 21 (1992) to set off global actions of sustainable development, or the World Summit on Sustainable Development (WSSD 2002), discussions around the interactions between environment and human behaviours are fixated on the neoliberal agenda (Castro 2004). Carvalho (2001) argues that the international political and economic systems are inadequate to meet the objectives of sustainable development, while Kelly et al. (2007, p.15) point out that economic growth results in continuous ''arrogant decision making''. However, even though it remains questionable whether adopting a model of sustainable development with a business as usual outlook is desirable, feasible and controllable, the current society is already locked-in (Bergh 1996). Sneddon et al. (2006, p.254) further point out two major critics around the political agenda around sustainable development:

> While the broad goals were widely embraced, critics argued that steps toward their implementation would be thwarted; first, by fundamental contradictions between the renewed call for economic growth in developing countries and enhanced levels of ecological conservation; and, second, by the inattention to power relations among the local-to-global actors and institutions supporting unsustainable development.

Kelly et al. (2007, p.13) also address the tensions between local-national actors, arguing that scientific knowledge from political centers are often too rigid and inflexible, without taking into considerations the local knowledge and experiences:

> Many environmental decisions are ultimately decisions about local areas. However, the particularities of the local are frequently anathema to the centralising tendencies

> of the state and to the standardising and translocal practices of contemporary production.

There is a need for a paradigm shift in policy administration to ensure that international institutions are supporting resource evaluation in each nation in order to stop global resources from being overshot (Barry 2012). The consumption and production process produce externalities, which are environmental costs resulting from economic activities (van Passel 2008). The justification of massive consumption and development has a huge impact on global environmental systems. As a consequence, we should aim to pursue consumption patterns that would meet social and economic development while mitigating impacts on the ecosystem (IPCC 2013, Chapter 20). The report (ibid.) points out that the development models in carbon-intensive, industrialized and developing countries are inconsistent with sustainable concepts associated with poverty reduction, improving human health, securing food and livelihoods. The report proposes alternative consumption patterns which take into account our natural resources (ibid., p.7):

> One way that sustainable development pathways can contribute to climate resilience is by pursuing consumption patterns that ensure social and economic development while reducing use of natural resources and maintaining ecosystem services.

Barry (2007, p.259) further points out that ‘’the focus on efficiency gains is often seen as wildly optimistic where all current experience suggests that in most areas, efficiency gains per unit of consumption are usually outstripped by overall increases in consumption. Economic developments focus on the notion of ‘growth’ on the basis of maximising profit and utility, and in turn point towards international business as usual (Reid 1995, p.136):

> Economic growth has an obvious appeal for political leaders in inequitable societies: the ‘trickle-down’ effect will allow all to benefit from growth without disturbing the status quo, and particularly without threatening the power and privileges of the better off.

European Commission (2010) points out that there exists a clear consensus at international, EU and national levels that the ‘business as usual’ is not an option. Radical transformation is needed to switch us from unsustainability (Hopwood et al. 2005). Barry (2007) points out that green thinking has long criticised the conventional economic growth model. Green political approaches readdress political and economic concepts in the paradigm shift from

the previous focus on a growth oriented economy (ibid.). Sneddon et al. (2006, p.254) point out that institutional principles often evolve along with the practice of sustainable development as ''a bold call to recalibrate institutional mechanisms at global, national and local levels''. The *Europe 2020 Strategy* (2010) proposes an inclusive growth model to reform the financial system and promote transparency. To fill in regulatory gaps and offer innovation policies, the European Union has called for collaborative efforts in transformation of structural weaknesses in Europe's unsustainable economic model (ibid.).

To sum up, the political top-down, business-as-usual, growth model in sustainable development has been shaped by an economic-driven social structure. Since political agenda is inherent in driving sustainable development, we are in a challenging situation where the society at large is locked-in and unable to harness environmental resources in effective ways. From the literature, it is clear that people are not satisfied with the current business-as-usual and call for changes. However, what the changes will involve and how to engage people in envisioning the changes remain unclear. Therefore, in our main study with Q methodology, we aim to engage participants in rethinking and re-examining the current business-as-usual model and ask them to construct their own viewpoints on opportunities and solutions for sustainable development in the Irish context (see Chapter 3 for the Q methodology design and Chapter 7 for results).

2.2.2 Public participation in sustainable development

There have been increasing public participation[9] in national and international environmental policies, and also the recognition among decision makers on who is affecting and affected by decisions and actions (Reed et al. 2009, p.1933):

> Public participation is becoming increasingly embedded in national and international environmental policy, as decision makers recognise the need to understand who is affected by the decisions and actions they take, and who has the power to influence their outcome, i.e. the stakeholders.

However, Castro (2004) points out that the current efforts in public participation around sustainable development is deemed to assist the experts instead of empowering communities. Public responses play tremendous roles in shaping the outcome of technologies and innovations, since technologies are not culture-free (Carley & Christie 1992, p.163). The IPCC report (2013, Chapter 17) also points out that the public sector plays an important role in developing new technologies, since developing new sciences are highly associated with social processes (Kim 2007). Strategic Communication in Sustainable Development (2006) further points out that social awareness is one of the key elements in supporting sustainable development. The social, ethical and economic values are recognized by the lay public as inherent to science (Levidow & Marris 2001). However, the social part of sustainability is often overlooked by current orthodoxy (Cooper & van der Vorst 1997). This is

[9] According to the definition in the Oxford English dictionary, participation is defined as 'the action of taking part in something'. However, the objectives of participation vary, with some focusing on engagement and involvement of stakeholders and others aiming at collaborations between various parties. Arnstein's (1969) ladder of participation is based on different degrees of participation, ranging from non-participation to people becoming the power and decision-holder with increased citizen power. Bigg (1989) refers to the level of engagement as relationships that can be contractual, consultative, collaborative and collegiate, whereas Rowe and Frewer (2005) argue that based on the flow of information, public engagement activities could be divided into three concepts: communication, consultant, and participation. Rowe & Frewer (2005, p.253) describe public participation as: ''a general definition of public participation with which few would argue is the practice of involving members of the public in the agenda setting, decision-making, and policy-forming activities of organizations/institutions responsible for policy development.''

quite disturbing, as societal discourses are fundamental drivers in mobilizing change and awareness in the public sphere (Blühdorn 2011). When culture values are acknowledged, it is more likely for environmental policy makers to secure commitments in environmental behaviors (Kelly et al. 2007, p.5). In addition, when the role of environmental policy is an ''enabler of social and environmental action rather than policy as control takes seriously on board citizens' demands for fair and robust environmental regulation and implementation as well as for participation in decision making (ibid., p.18).

Farrington (1998) argues that when there is a lack of a key interface between what science and technology have to offer and what people demand from it, technology transfer and knowledge exchange becomes challenging. For example, van Eijndhoven (1995) argues that public debates around scientific and technological issues often result in a polarized public: those who just accept the autonomy of technology development and trust the decisions made by 'experts', against those who are sceptical and suspicious of technologies and innovations. Raven et al. (2009, p.975) also point out that reluctances might arise during the transitional process of technology adoptions from local citizens, consumers or stakeholders like NGOs and national political and policy actors: ''without explicit attention, societal acceptance tends to be neglected, or insufficient understanding of the societal risks tend to be hold true''. Van Eijndhoven (1995) asserts that the quality of opinion-forming among the public is too low due to an exclusive model of scientific knowledge. Furthermore, Miller (2001) points out that we still need to take into consideration the existing knowledge of the intended audience rather than assuming that there is absolutely no knowledge gap between the scientists and the public. Miller (ibid., p.119) then argues that the current scientific community needs to be more visible for the public to understand the potentials and limitations of scientific issues:

> If we are entering a new age for public understanding of science, it is important that citizens get used to scientists arguing out controversial facts, theories, and issues. More of what currently goes on backstage in the scientific community has to become more visible if people are going to get a clearer idea of the potential and limitations of the new wonders science is proclaiming.

De Stefano (2010) also points out that there is a lack of proactive information given to non-governmental stakeholders, which results in the lack of engagement in the

decision-making processes. Kim (2007, p.293) points out that the lack of public engagement in sustainability perhaps explains the numerous attempts of non-governmental organizations such as NGOs and the scientific communities to facilitate the process of information flow. The OECD report (2009, Chapter 1, p.17) further states that we should ''promote broader participation by NGOs and relevant public organisations in the development and implementation of national and local development policies, programmes and projects''. Kim (2007) further points out that public engagement in science as a mean to improve communication effectiveness of science.

There has been a call for more 'democratic' forms of science and technology policy making, one which take into account public participation (Fischer 2000). For example, consensus is an ideal for reaching public's agreement on deliberative democracy (Habermas 1996, cited in Dryzek & Niemeyer 2006, p.635). Consensus refers to "the values and beliefs that help explain particular preferences, which can be influenced by both decision procedures and political contexts" (ibid., p.368).

> Effective policy making consists of cautious interventions that are tested and criticized from a variety of directions so that their benefits and flaws may be revealed, and policy improved" (Popper 1966, cited in Dryzek & Niemeyer 2006, p.635).

It is essential for the public to define its interest for establishing a functioning democracy. John Dewey (1927) points out that with the expansion of technology, there's the disappearance of a defined public. He states that, to enhance communication, understanding actions and relevant consequences are essential (p.152):

> Only when there exist signs or symbols of activities and of their outcome can the flux be viewed as from without, be arrested for consideration and esteem, and be regulated.

Meppem & Gill's (1998) call for a sustainable development engagement model which involves representations of different stakeholders to participate in multidisciplinary dialogues. Craig (2007) also argues that for the general public, promoting social conditions where a more inclusive, participative and reflexive progress of communication practices take place, will radically enhance the constitution of pluralistic dialogues. Van Dijck (2003) also

points out that effective public engagement models in sustainable development will increase social interactions and reduce fragmentation of stakeholders and disciplines, where sustainable development models no longer remain merely top-down and expert-driven.[10] On the global level there is a need to call on participatory compliance mechanisms to trigger communications from the public (Barreira 2012).

In addition, more transparent political participatory approaches with clear scientific measures could achieve a greener environment (Frantzi et al. 2009). Engagement models around sustainable development need tremendous inputs from public perspectives (Kim 2007). Farrington (1998) further points out that we should not regard 'participation' merely as a rhetoric, but aim to envision its provisions and applications around sustainable development (De Stefano 2010). Comparative studies of European politics have demonstrated that ensuring democratic practices contribute to more successful sustainable development (Kelly et al. 2007, p.16):

> There is also widespread recognition that eco-modernist policies have tended to emphasise the managerial and regulatory aspects in relation to limiting environmental damage rather than its potential democratic aspects.

In the pursuit of consensus building and deliberative democracy, Dryzek & Niemeyer (2006, p.648) argued that "outcomes are democratically legitimate to the degree they are structured by free and reasoned meta-consensus among individuals subject to them." Meta-consensus facilitates the process of seeking mutually acceptable outcomes rather than seeking compromises between initially hostile partisans (ibid., p.642). Even with continuing dissensus across people at normative, epistemic, and preference levels, mediation over a development dispute could help achieve an alternative outcome, signalling the benefits of

[10] Public Understanding of Science (PUS) theories in the 1960 were mainly focused on Snow's perceived divide of the two paradigms- natural sciences and social sciences, and the gap of lay knowledge versus expert knowledge regarding science and technology (van Dijck 2003). A deficit model was adopted in the 1980s and early 1990s by policy makers, industry lobbyists and social scientists with the assumption that the public's opposition to new techno-scientific developments was based on fear and ignorance (Levidow & Marris 2001). It is convinced as a top-down, science-centred model (Weigold 2001) with the notion drawn from natural and social scientists that the public is essentially lacking in scientific knowledge and needs to be 'educated'.

deliberation in the democratic process (Dryzek & Niemeyer 2006). Later on in this study, we will also discuss how the theoretical frame of deliberative democracy transform stakeholder dialogues for the analysis of stakeholder communication in sustainable development (see 7.3.4).

To sum up, the call for more effective public participation and engagement models in sustainable development aim to move beyond the business-as-usual model with more human-centre objectives and deliberative processes. Collaborative and multidisciplinary stakeholder dialogues would also help drive community learning and facilitate meaningful change in political decision-making processes. In later chapters, we will explore how Q methodology, the research methodology applied in our study, teases out the empowerment of participants in decision-making process via deliberative, bottom-up approaches.

2.2.3 The Cleantech[11] perspective as a technocratic solution in the ecological modernisation of sustainable development

Fischer (2000) points out that science and technology are important in dealing with the environmental crisis. With interrelated challenges of climate, energy and economic issues, technological innovation is often considered one of the most effective means in providing solutions when enacted with the right combination of political, social and financial will (Knowles et al. 2012). Hopwood et al. (2005, p.38) points out that technocratic environmentalism in sustainable development was related to capitalism, the industrial revolution and modern science: ''on the whole the relationship between people and the environment was conceived as humanity's triumph over nature. This Promethean view (Dryzek, 1997) was that human knowledge and technology could overcome all obstacles including natural and environmental ones''. From a techno-optimistic approach, sustainable development can be viewed as a scientific and technological endeavour (Kate et al. 2005, p.19): ''this emerging enterprise is focused on deepening our understanding of socio-ecological systems in particular places while exploring innovative mechanisms for producing knowledge so that it is relevant, credible, and legitimate to local decision makers''.

[11] In this study, we focus particularly on Cleantech as a technocratic solution to sustainable development since our study population sample includes several stakeholders from *The Green Way*, a Dublin Cleantech cluster which aims to deliver economic growth and employment through collaborative efforts in clean technology solutions (see Chapter 1, 1.1 and Chapter 3, Table 3.1 and Table 3.2 for the list of stakeholders for semi-structured interviews and Q methodology study).

Ahmed and Stein (2004) states that science and technology are amongst the most effective means to enhance growth and socio-economic development of nations. Kelly et al. (2007, p.12) also points out the predominant position of science and technology:

> In its most idealised form, it assumes that 'scientific facts' established in the laboratory are generalisable to other contexts and places and that these facts can be verified in an unbiased and disinterested way apart from political, economic or organisational interference. These assumptions have legitimated its predominant position in identifying environmental problems and offering solutions to them in the complex technological world of advanced industrial societies.

Mol & Spaargaren (2000, p.21) state that ''the de-industrialisation perspective as an overall theory and alternative has lost most of its attraction in the contemporary environmental debate.''. The theory of ecological modernisation signals a radical approach of reconsidering the relationship between production, consumption, state practices, and political discourses (Hajer 1995; Mol 1995).

In the past decade, there is an urgent call in sustainable development discussions for seeking 'alternatives' to replace coals and fossil fuels. Cleantech, or clean technology, is often regarded as an essential endeavor to achieve sustainability, as ''going green is the largest economic opportunity of the 21st century'' (GCII 2012). Clean technology has more potential in ''delivering equal or superior performance compared with conventional offerings'' (Pernick & Wilder 2007). López & Toman (2006) convincingly states that innovations and utilizations in Cleantech could contribute to economic activities. Discussions and debates in sustainable development solutions reveal the opportunities of Cleantech and its implications for society, policy, institutions, and organizations (Clift 1997; van Passel 2008). Van Passel (2008, p.4) defines Cleantech as part of the 'weak' sustainability[12] and ''all products, services or

[12] Technology is also considered the root of divisions between strong and weak sustainability perspectives. Weak sustainability focuses on a human-centered worldview with a growth-oriented approach to economic development, as adopted in the western industrialized world, while advocates for strong sustainability call for a more radical change of lifestyle based upon greater self-reliance. Those who advocate for strong sustainability argues that continuous technological change will not alter the pessimistic outcome if it could not ensure the preservation of environmental resources (van Passel 2008).

processes using technologies that optimize our use of natural resources and minimize environmental impacts''. He also maintains that Cleantech approach can support the design of environmental policies and strategies, and furthermore minimize conflicts between different actors (ibid.) OECD (2014, p.59) also points out the necessity of implementing 'green growth' in the political agenda: ''to combat climate change, help prevent costly environmental degradation and better manage natural resources, governments must catalyse investment and innovation in clean technologies and infrastructure''.

Studies around Cleantech examine its strong economic-driven business and commercialization agenda (Freedman 2012; Knowles et al. 2012; Burtis et al. 2004; Cooke 2008; Cooper & van der Vorst 1997; Ernst & Young 2011). Cook (2008, p.379) points out the competitiveness of cleantech and its economic-prioritizing agenda, saying that its ''products and services are designed to be competitive with conventional technologies by being innovations, which means commercialized new (cleantech) knowledge with an economic rationale first and the environmental one second''. Knowles et al. (2012, p.10) also point about the positive contributions of Cleantech:

> The term cleantech, (sometimes used interchangeably with greentech, sustainable technologies, and environmental technologies) embraces a wide range of innovative products and services that contribute both financial returns and positive environmental impacts and outcomes.

However, Carley & Christie (1992, p.) point out that a serious weakness with the argument that technology and innovation could achieve an effective outcome in sustainable development is a false assumption, as technologies are not culture-free. Reid (1995) also argues that a positivist approach leads to an international framework of a business-as-usual model, which responds to Meppem & Gill's (1998) critique that the current societies are adopting positivist-driven, neoclassical economics model in decision-making processes which lead to unsustainability. Freedman (2012) also warns that if we are fully preoccupied around the notion of technological developments, it might lead to the danger of viewing the sustainable development paradigm merely as a model for economic growth. The IPCC report (2013, Chapter 17, p.2) also points out that the consideration of qualitative measures should be recognized even within economic models: ''economic analysis is moving away from a unique emphasis on efficiency, market solutions, and benefit/cost analysis of adaptation to

include consideration of non-monetary and non-market measures; risks; inequities; behavioral biases; barriers and limits and consideration of ancillary benefits and costs''. Reid (1995, pp.130-131) further discusses the pitfalls of 'technocentricism' (O'Riordan 1981), in which we value the natural world as a resource rather than simply exchange value, where the optimism approach excludes other alternatives for creating sustainability:

> It tends to disparage other approaches, particularly if they include 'subjective' or non-quantitative assessments or advocate simple, low-cost or 'low-tech' solutions. This disparagement may extend to a reluctance to acknowledge the right of non-technologists to make significant contributions.

Cooke (2008, p.379) argues that Cleantech ''being market-oriented as a priority means that environmental regulations are not as much of an innovation driver as they were in the past, but rather merely one among many''. In addition, Huber (1985) criticises that ecological modernisation is attempting to transform a dirty and ugly industrial caterpillar into an ecological butterfly. In addition, Porter (1991, p.96) further argues that "properly constructed regulatory standards will encourage companies to re-engineer their technology. The result in many cases is a process that not only pollutes less but lowers cost or improves quality". In a green economy, industries seem keen to have their voices heard in discussions around sustainable development issues, especially in demonstrating their commitment to sustainability issues and how they are incorporated in policies and operations (Lingan 2012). However, Saha & Darnton (2005, p.121) points out that there remains the paradox that, when a company communicates its green or socially responsible identity, it remains questionable whether that's the case, since ''some company decision makers have also become aware that there are both internal and external opportunities and benefits to becoming green''. In addition, policy-makers and organizations also often portray themselves as part of a 'greening' initiative, while in fact they are advocates of maximizing economic wealth (Cooper & van der Vorst 1997).

To sum up, from the literature there is a danger of using ecological modernisation to facilitate ''a set of processes and perspectives whereby capitalism is currently trying to achieve its version of sustainable development" (Pepper 1998, p.2). To secure and support low carbon together with a Cleantech approach, we need to include resource efficiency as well as social criteria for the current economic model, instead of adopting a merely economic

driven agenda which leads to a business-as-usual development philosophy. To investigate the dimension of ecological modernisation and how Cleantech stakeholders would define and discuss the notion of sustainable development, in our semi-structured interviews and the main Q methodology study, we aim to include participants from the Cleantech business sector and investigate their perspectives (see Chapter 3, section 3.3.2).

2.2.4 The three pillars and and other dimensions in sustainable development

The most commonly perceived compositions of sustainable development model are those proposed in the United Nations World Summit report (2005) as the three pillars: economic development, social development, and environmental protection. These pillars are intertwined and are often referred to as the 'triple bottom line'. Sneddon et al. (2006) assert that these three dimensions in sustainable development should be able to generate pragmatic solutions to wicked problems in sustainable development. However, Vifell & Soneryd (2012) argues that it remains questionable whether the integration of the three dimensions is applicable in practice. Cuthill (2002) points out that this is due to the fact that not all three dimensions have the same ability to address explicitly their interconnected problems, especially the social dimension. Strategic Communication in Sustainable Development (2006) also argues that the three pillars approach is somewhat of a 'utopian' approach, since it fails to address inequality in power and interests in the economic, societal and environmental dimensions. Lehtonen (2004, p.201) further points out a conceptual critique against the three-pillar model:

> By continuing to distinguish the 'social' from the 'economic', the three-pillar model contributes to strengthening the idea that the economy can be treated as a separate sphere, detached from the social context within which all human activities are embedded.

Scholars propose different dimensions for achieving sustainable development. Lehtonen (2004) argues that rather than adopting a single framework which is not desirable or feasible for studying the interface of environmental and social terrain, we should be open to suggestions and integrations of new dimensions for the sustainable development model. For example, Parris & Kate (2003) present the taxonomy of sustainable development by identifying three elements that need to be sustained (nature, life support, community) and

those which need to be developed (people, economy, society). Cooper & van der Vorst (1995) discusses four principles of sustainable development: futurity, environment, equity, and public participation. Similar to Cooper & van der Vorst (ibid.) model, the Sustainable Society Foundation[13](SSF) points out four basic principles of sustainability: intra-generational equity, intergenerational equity, ecological limits, and the precautionary principle, which attempts to encompass the social and ecological equity aspects of the present and future generation.

Meppen & Gill (1998) articulate two major interpretations of sustainability: normative and positivist interpretation[14]. However, Ellis et al. (2007) argues that positivist approaches in policy research which generates complex social phenomena via value-free research neglect contextual subjectivities. A post-positivist approach, they argue (ibid.), suggests that interpreting the world from a single objective 'truth' is not ideal, and that heterogeneous perspectives could help tease out the complexity of the world (ibid.). Barry (2007) argues that green politics foreground new economic thinking and a reassessment of materialistic lifestyles, which in turn focus on developing a radical political and economic agenda with an emphasis on the social and economic bottom lines. Barry (ibid.) consequently introduces the notion of a 'post-growth' economy, which advocates a socio-economic system less growth orientated, and in turn generates environmental and political benefits.

Meanwhile, Redclift (2005, p.14) proposes interactions between three major dimensions in sustainable development: new material realities, science and technology, and shifts in mind-sets:

> The challenge for critical thinking, then, is to identify the ways in which material changes - in the physical environment, information technologies and the human body - requiring us to revisit the idea of sustainable development. We need, in short, to

[13]Sustainable Society Index (SSI): To stimulate and assist societies in their development towards sustainability, the Sustainable Society Foundation (SSF) was established in 2006 by Geurt van de Kerk and Arthur Manuel which aims to develop the Sustainable Society Index (SSI) for national, regional and local levels, with contributions from experts worldwide. Source: http://www.ssfindex.com/

[14]Normative interpretation of sustainability refers to Brundtland's statement regarding sustainable development. Although the statement pinpoints social, ecological, and economic dimensions, Meppem & Gill (ibid.) says that its ambiguity address mostly to those who opt for technological process to support the regeneration of the environment. The positivist interpretations of sustainability outline the business as usual model, by all accounts the decision-making processes in the current neo-liberal economic systems.

examine the way in which new materialities influence the cultural constructions we place on the environment.

In Kelly et al.'s (2007) study on environmental attitudes, values and behaviour in Ireland, they identify five types of discourses: moral, radical political, romantic, scientific, and regulatory. They argue that from the Irish literature, these five discourses demonstrate potentials in articulating environmental attitudes and values and that the analysis of the discourses will ''increase opportunities for more informed democratic discussion in which different voices are heard and responded to, and more transparent policy decision making facilitated'' (ibid., p.12). New criteria are needed to establish a global model of sustainable development which will re-identify and re-address needs that are compatible and fair to the developing world, to articulate environmental sustainability, long-term economic and social security (Christie & Warburton 2001).

To sum up, much of the literature points out that the three pillars (environmental, societal, economic) in sustainable development are not ideal in addressing the complexities of sustainable development issues. Scholars have called for more dimensions to be included in sustainable development, which should be flexible and dynamic to embrace new possibilities, as well as being more careful and providing detailed considerations of the interactions among all dimensions. In our study, we aim to investigate how Irish stakeholders (the green pioneers) regard the three pillars and dimensions of sustainable development. Therefore we have incorporated the findings from the literature review into the semi-structured interview designs (see Chapter 4, section 4.4).

2.3 The contribution of stakeholder communication in sustainable development

The literature around the contribution of stakeholder communication in sustainable development cover a wide range of topics: the facilitation of national and international environmental policies and coordination (Olsen 2012; Reed et al. 2009), inter-disciplinary, multi-dimensional knowledge integration (de Haan 2011; Rave et al. 2009; Kate et al. 2005; Macnaghten et al. 2005; Cuthill 2002; Logan 2001; Kochan 2000), the roles and implications of communication processes of stakeholders in sustainable development (Cooper & van der Vorst 1997; van Dijck 2003) and articulating stakeholder agendas regarding sustainable

development (Lingan 2012; Kim 2007; Voinov 2007; Cuthill 2002), as well as evaluations of the success of communication around sustainable development (Lehtonen 2004; Miller 2001; Key 1999). Stakeholder participation is particularly useful in situations where both the problem and the potential solutions are not easily understood (Cuppen et al. 2010). To investigate the effectiveness of stakeholder communication, studies have addressed the inclusiveness and participatory processes of communication practices to enhance open dialogues between stakeholders (Ahmed & Stein 2004; Craig 2007), the creation of interfaces for science and the public (Farrington 1998; van Dijck 2003), and the challenges of accommodating diverse stakeholder perspectives in complex and wicked problems within sustainable development (Craig 2007; Green 2002; Rittel & Webber 1973). OECD (2000a) points out that communication in sustainable development support effective policy making and public participation towards environmental sustainability. While the *Strategic* Communication in Sustainable Development (2006, p.1) states the role of communication for sustainable development:

> Communication serves information exchange, establishing consensus among divergent opinions and interests, and facilitates the building of know-how, decision making and action capacities at the heart of the delicate cooperation between government, civil society groups and the private sector.

To investigate how stakeholder communication contribute to sustainable development, the following subsections discuss how identifying stakeholder perspectives contribute to sustainable development; how multidisciplinary stakeholder communication approaches contribute to sustainable development; and how stakeholder communication strategies contribute overall to sustainable development.

2.3.1 Identifying stakeholder perspectives

In current years, not only firms and businesses but also non-governmental organizations (NGOs), regulators, media, and policymakers have applied stakeholder theories into practice to identify modes of effective communication among stakeholders (Fontaine et al. 2006). Redclift (2005) states that it is essential for all sectors in society to actively participate in consultation and decision making to achieve sustainable development. Reid (1995, p.236) most pointedly asserts that ‘’it is not the resources of the planet that we have to manage, but ourselves’’. while Meppem & Gill (1998) highlight the difficulty of integrating diverse

stakeholder perspectives in accommodating complexities in sustainable development. More communication studies are needed to tease out the disparate stakeholder perspectives around sustainable development and identify similarities and differences among these perspectives, since subjectivity and interpretation of stakeholder perspectives are crucial to environmental policy analysis and studies (Ellis et al. 2007). Barry & Proops (1999, p.337-8) also point out that ''finding out how people understand an issue is essential to the whole process of 'problem identification', both normatively and politically''.

Curry et al. (2012, p.580) assert that it is essential to understand and underpin stakeholders' attitudes from all sectors in the society:

> Participation as problem structuring involves learning about the different perspectives on the problem and its solutions. This requires a relatively high degree of participation; a process in which stakeholders with different backgrounds, knowledge, values and expertise interact and exchange their knowledge and ideas. This kind of participatory processes should facilitate mutual learning by generating, articulating and evaluating divergent knowledge claims and viewpoints. Hence, they should provide ample opportunity to scrutinize conflicting viewpoints and knowledge claims, rather than for instance negotiating or compromising preferences. After all, negotiation or compromising is only possible when people know what their own, and other people's preferences are.

Stakeholder perspectives offer us insights into the representation and involvement of stakeholders in environmental decision-making processes (Reed et al. 2009; Starks & Trinidad 2007). Identifying discourses from stakeholder perspectives further help support policy development in sustainable development (Curry et al. 2012). Many studies have investigated sustainability related issues with a focus on stakeholder perspectives. For example, FitzGibbon & Mensah (2012) identify water challenges in Ghana through a series of interviews with stakeholders. In another study, Cuthill (2002) explores the integration of inter-disciplinary knowledge in sustainable development using eighteen in-depth, semi-structured interviews with local citizens. Sneddon et al. (2006, p.264) further concludes that ''a salient way to confront the dynamism and complexity of the current era of global environmental governance is to adopt pluralistic and trans-disciplinary approaches (e.g.,

ecological economics, political ecology, development-as-freedom) to the analysis of sustainability dilemmas''.

Q methodology, a mixed-methods approach designed to tease out subjectivities and discourses around a subject of study, has been largely used to underpin perspectives of stakeholders around sustainability. Q methodology studies could certainly help stakeholders contemplate a range of helpful perspectives (Webler et al. 2009). For example, in a study to investigate responses to climate change, Niemeyer et al. (2005) applies Q methodology for a systematic approach to study social responses. In Barry & Proops' (1999) Q methodology study on sustainability discourses, they identified perceptions of environmental issues in various groups with the aim to support environmental policy making and inform strategies for formulating policies to generate wider acceptance within sustainability. Frantzi et al. (2009) also explored international environmental regimes and their effectiveness with Q methodology. They conclude that debates in the academia regarding the effectiveness of international environmental regimes can be seen as extending to practitioners. (ibid.)

To sum up, identifying stakeholder perspectives around sustainable development is crucial to understanding how heterogeneous stakeholders determine the exchange of knowledge and how consensus is formed around sustainable development. Understanding stakeholder perspectives is also one of the main objectives pointed out in our study (see Chapter 1, section 1.2). The literature has also revealed the benefits of applying Q methodology in identifying stakeholder perspectives. In this study, we have chosen to apply Q methodology to investigate the perspectives of stakeholders regarding communication around sustainable development. Further details regarding the theories and approaches of Q methodology is elaborated in the next chapter (Chapter 3).

2.3.2 Multidisciplinary approaches in stakeholder communication

Multidisciplinary approaches help strengthen knowledge capacity (OECD 2002). Cuppen et al. (2010) point out that multidisciplinary stakeholder groups deliver better decisions, since there are more diversities in viewpoints than from homogeneous groups. Sneddon et al. (2006) point out that trans-disciplinary modes of knowledge are essential endeavours and should be taken into account in communication around sustainable development problems. Roberts (2000) also states that social learning is more likely to succeed if stakeholder interact and inform on another's actions in a self-perpetuating manner. Transition towards a green

economy needs stakeholder skills and know-how, in addition to social protection and social dialogue (Cots 2011). For example, Ahmed & Stein (2004) point out that cooperation in science and technology creates avenues to inform international policy designs and also increase the opportunity for integration of knowledge capacity-building for tackling global problems. Since the late 1990s, there have been keen debates over the openness of science and technology in European policies and also a call for more transparency, participation, and dialogues (Levidow & Marris 2001). Knowledge capacity has also been addressed in EU-FP7[15] with the objective for Europe to 'become the most dynamic competitive knowledge-based economy in the world'. FP7's aims and objectives simultaneously reflect the essence of the European Union's Lisbon Strategy[16], where knowledge is also considered one of the prerequisites for a sound economic future.

Cash et al. (2003) point out that scientific knowledge is reflected on stakeholders' divergent values and beliefs, and that's why multidisciplinary discussions could help stimulate and challenge existing knowledge as well as generating new knowledge and scientific solutions. Multidisciplinary approaches also ensure transparency and knowledge exchange beyond the scientific communities (Miller 2001). However, Sneddon et al. (2006, p.263) point out that as our knowledge of sustainable development increase, it also becomes harder to really pinpoint its core definition:

> While many have long complained that sustainable development is difficult to define, our knowledge of what sustainability means has increased considerably, while it is development that has in many ways become more difficult to define. In addition, the challenges of both sustainability and development are more difficult than understood at the time of Brundtland because of several interrelated phenomena.

Donner (2001) further argues that it is essential to discuss different viewpoints in complex issues as early as possible in stakeholder collaboration processes. Meaningful collaboration

[15] FP7 stands for the Seventh Framework Programme for Research and Technological Development, which is the main instrument for funding research in Europe from 2007-2013. Several topics are addressed, including employment needs, competitiveness, and quality of life.

[16] Lisbon Strategy was an action and development plan drawn up in March, 2000, for the economy of the European Union between 2000 and 2010. Also known as the Lisbon Agenda or Lisbon Process, the aim was to make the EU "the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion".

of social sciences, engineers and natural sciences could contribute to policy debates, while generating new knowledge and establishing relationships in cross-disciplinary work fields (Macnaghten et al. 2005). In their study exploring international environmental regime effectiveness, Frantzi et al. (2009) also concludes that having access to information regarding environmental issues for everyone is essential. Macnaghten et al. (2005) further defines meaningful collaboration among multi-disciplinary stakeholders as contributions from social sciences, engineers and natural sciences in policy debates. *Strategic Communication in Sustainable Development* (2006, p.16) also point out that participation of multi-stakeholders also enables more effective policies:

> Broad participation helps to open up debate to new ideas and sources of information; expose issues that need to be addressed; enable problems, needs and preferences to be expressed; identify the capabilities required to address them; and develop a consensus on the need for action that leads to better implementation.

Logan (2001, p.158) also points out that multidisciplinary stakeholder efforts feed into consensus building around wicked problems in sustainable development by placing more emphasis on improving communication process among the public, scientists, politicians, and the media: ''the common roots, objectives, challenges, transformations, and questions remain a common point of pride and an underutilized foundation for progress''. Ahmed & Stein (2004, p.20) also emphasize the multidisciplinary efforts in identifying issues around sustainable development.

> Sustainability requires new thinking across the spectrum of human endeavour, not merely among scientists and technologists. Economic, social and institutional innovations must keep pace with technological innovations. Sustainable development is a multidisciplinary process that involves all issues, such as science, innovation, technology, R&D, information technology and e-commerce, economic development, health, foreign direct investment and multinational companies, international debt and aid, trade, politics, war, natural disasters, population growth, terrorism and related issues.

To sum up, multidisciplinary approaches in stakeholder communication are needed for building knowledge capacity in complex scientific issues. Multidisciplinary approaches also contribute to stakeholder collaborations and achieving consensus. To investigate how

different modes of communication interact and integrate to generate various perspectives around sustainable development, multidisciplinary approaches in stakeholder communication is crucial. As a result, in our main study, we aim to ensure a balanced representation of participants from diverse disciplines (see Chapter 3, section 3.3.2).

2.3.3 Stakeholder communication strategies around sustainable development

Swindall (2000) points out that by all accounts more robust communication strategies should be developed to improve communication activities adjacent to technology related policies, options and actions. Roberts (2000) also points out that in wicked problems, traditional linear methods do not work. It is then crucial to recognize various viewpoints and welcome potential solutions. Some scholars call this process the 'appreciative inquiry' (Barrett 1995; Cooperrider & Srivastva 1987; Roberts 2000). The OECD (2002) report further suggests that participation and collaboration of stakeholders are prerequisites for sustainable development strategies. The report (ibid., p.16) defines strategies for sustainable development as ''a coordinated set of participatory and continuously improving processes of analysis, debate, capacity strengthening, planning and investment, which integrates the economic, social and environmental objectives''. Communication in scientific issues should ensure reciprocity among all stakeholders involved (van Dijck 2003). Kim (2007, p.306) points out that ''we need to effectively communicate all of the problem's relevance''. Communication strategies around sustainable development should be formulated on the basis of incorporating all point of views (Craig 2007). Vicente & Partidário (2006) point out that adopting complexities in various modalities of communication where different viewpoints co-exist to accommodate different objectives and target groups could be very useful in dealing with a variety of values at stake, especially when it concerns non-scientific values in the decision-making process regarding technologies. Van Eijndhoven (1995, p.7) further points out how viewpoints regarding complex social and scientific issues exist in various places:

> Opinion-forming about science and technology takes place in countless different arenas in society, in companies, in trade unions, in social organizations, and of course in political parties and in parliament.

It was stated that there are several criteria for communication strategies around sustainable development: multi-stakeholder negotiations, shared visions and objectives, initiatives to

ensure learning, standards and principles for sectors through legislation and market-based instruments, and an authority (i.e. state) to coordinate communication (Strategic Communication for Sustainable Development 2006, p.15). These proposed criteria respond to studies which address the importance of multidisciplinary efforts from decentralized authorities, the private sector and civil society, as well as marginalized groups (Logan 2001; Miller 2001). European Commission (2011) points out that collaboration between non-state actors and marginal groups are vital towards the implementation of sustainability, where partnership in forms of national and international collaborations have been proven to be very valuable in increasing energy access, energy security and promoting renewable energy and efficiency. Cash et al. (2003) propose a communication framework for sustainable development which emphasizes on the interactions between scholars and practitioners, whereas Miller (2001, p.117) thinks that one of the ways to achieve effective communication is through consensus conferences, ''in which a well-briefed but lay group of citizens evaluate new scientific issues and techniques, consensus building, learning process''. Past studies have shown that if consensus is not achieved and the communication between stakeholders are not taken seriously, it might result in stakeholders withdrawing from the project, or worse, with them initiating resistances towards the projects (Raven et al. 2009).

Regarding building consensus in complex problems, Roberts (2000) mentions three types of stakeholder communication strategies: authoritative, competitive, and collaborative. In authoritative strategies, also known as 'taming strategies', a set of selected stakeholders have the authority to define the problem and propose a solution. These stakeholders are likely to be knowledgeable in their expertise or have coercive power. Competitive strategy is highly associated with the pursuit of power. In the market economy it is reflected in industrial competitions, for example, alternative energy solutions to mitigate climate change. The collaborative strategy adopts a 'win-win' principle where agents join forces to produce collective outcomes. Carley & Christie (1992, p.174), also argue that ''collaboration and a drive towards consensus, rather than subordination, is the preferred approach''. However, Cuppen et al. (2010, p.580) point out that ''rather than focusing on consensus, stakeholder dialogues should allow for diversity of perspectives, preferences, (policy) options and goals''. They propose that besides stakeholder collaboration, stakeholder dialogues[17] are also

[17] A stakeholder dialogue is an organized meeting of stakeholders with different perspectives, knowledge and backgrounds, who would otherwise not meet (or not altogether), structured to a greater or lesser

essential. More structured stakeholder dialogues are needed to tease out multiple interests and values associated with complex environmental issues (ibid.).

However, there are challenges in stakeholder communication strategies around sustainable development, especially when there is a gap between the intentions of stakeholders and the ways they express their viewpoints in sustainable development (Hopwood et al. 2005). Therefore, it is uncertain whether every collaboration process would turn out to be satisfactory to everyone (Roberts 2000). Strategic Communication Sustainable Development (2006, p.10-11) also identifies challenges in communication strategies around sustainable development: 1) interventions needed to tackle complex changes at national and international levels 2) the translations of complex sustainable development dimensions into concrete communication messages 3) the formulation of strategic alliances ranging from politicians and private sectors to academia and the civil society. Studies have also shown that creating a social learning, adaptive, co-evolving environment where stakeholders meet, interact, and inform on one another's actions could facilitate collective achievements (van Dijck 2003; Roberts 2000; Meppem & Gill 1998). However, Roberts (2000, p.7) also point out the challenges of collaboration among stakeholders:

> Collaboration requires practice; it is a learned skill. If members do not have these skills, they need to acquire them and that takes additional time and resources. Then in the worst case, collaboration can end poorly. Dialogue can turn into debate and debate into protracted conflict with little to show for the hours of preparation and meetings. Positions can harden making agreement even more difficult to attain in the future. There are no guarantees that the outcomes of collaboration will be satisfactory to everyone.

Roberts (2000, p.13) then proposes a strategy of 'get the whole system in the room' to reduce stakeholder conflicts in wicked problems when everyone is fixated on 'my truth is better than your truth'. She emphasizes on the learning process and advises stakeholders to understand that each stakeholder holds 'some truth' in solving the wicked problems. In addition, since complexities in sustainable development can't be solved with straight-forward solutions by a single agency, a network approach where related partners work together simultaneously could be effective (Carley & Christie 1992, p.168). New

extent by means of specific methods, tools or techniques. Stakeholders deliberate on a specific issue in order to produce new insights. (Cuppen et al. 2010, p.580)

protocols of communicating science need to be drawn up to address new, uncertain, and controversial sciences in cross-disciplinary boundaries where public interest issues are genuine. For example, Jackson (2005) proposes a concerted strategy for policies around pro-environmental behaviors, in which the strategy should ensure solid pro-environmental institutional regulations, access to sustainable opportunities, and engagement initiatives. Strategic Communication in Sustainable Development (2006) further points out that effective sustainable development communication strategies should entail iterative stakeholder communication processes which address national as well as decentralized levels.

Communication around sustainable development issues requires new models of synthesis and coordination to achieve synergy from stakeholders (Kate et al. 2005). OECD (2002) also points out that strategies should tease out sustainable development problems, underlying challenges, long-term impacts, and corresponding to policy and institutional frameworks. Strategies ''should be backed by effective communication with stakeholders'' (ibid., p.43). Effective communication among stakeholders regarding sustainable development requires negotiation and mediation to enhance social expectations (Vicente & Partidário 2006; Cash et al. 2003).

To sum up, stakeholder communication strategies are able to contribute to sustainable development via different modalities of communication, such as consensus building, dialogues, collaborations and social learning between different stakeholders. The literature reveals that more effective communication strategies are needed to reduce stakeholder conflicts, identify values and perspectives around complex issues in sustainable development. To explore discussions around stakeholder communication strategies in sustainable development, we aim to come up with designs for a communication toolkit based on the final analysis of Q methodology study to explore how useful it would be for stakeholders and also investigate the design criteria of the communication toolkit based on stakeholder feedback (see Appendix A).

2.4 Concluding remarks

This chapter examines three major topics regarding stakeholder communication around sustainable development:

- The relationship between sustainable development and stakeholder communication

- The current efforts and discussions around sustainable development
- The contribution of stakeholder communication in sustainable development

A literature review on stakeholder communication around sustainable development reveals the heterogeneous nature of various environmental, economic, and societal dimensions in sustainable development (see 2.2.4), as well as how effective modes of stakeholder communication strategies could contribute to achieving sustainable development (2.3.3). The wicked nature of sustainable development is highly associated with heterogenous stakeholder perspectives (2.1.1). There are problems in defining sustainable development, associated with its oxymoronic and vague nature (2.1.2). The assertions above support the objectives of our study in terms of using a communication analysis to tease out stakeholder perspectives around sustainable development, and to reduce uncertainties around the definitions of sustainable development via a deliberative process, engaging participants in Q methodology. From the literature, the imbalances in sustainable development reveal the marginal discussions around societal issues and the overemphasis on economic driven agendas (2.1.3), which lead to the business-as-usual model (2.2.1). Scholars call for more meaningful public participation and engagement in sustainable development (2.2.2) as well as multidisciplinary stakeholder dialogues (2.3.2). A complete visibility of pluriformity of opinions in society where interactive social debates are present should certainly be applied to identify the most salient issues and strategize (2.3.1) - this conclusion resonates with the core value of our study, where we assert that identifying stakeholder perspectives is the first and essential step to tease out marginal perspectives and ensure effective public participant and engagement.

To underpin how stakeholder perspectives around sustainable development contribute to the investigation of heterogeneous risks and effects on society from political, economic and social factors, we argue that more empirical studies are needed to investigate stakeholder communication around sustainable development and strategize solutions around complex and wicked problems in sustainable development. As stated in the introduction chapter, our main objective of this study is to investigate stakeholder communication around sustainable development in Ireland via identifying the most prevalent stakeholder perspectives, using a stakeholder communication analysis.

Chapter 3 presents the methodological design of this study, which is mixed-methods approach with Q methodology - an explorative, intensive research methodology using quantitative factor analysis and qualitative interpretations - to construct subjectivities of stakeholders. From an overview of research methods used in previous studies regarding communication around sustainable development (see Chapter 3, section 3.1), we decided that Q methodology is the most suitable research methodology for teasing out the most prevalent stakeholder perspectives regarding issues and solutions around sustainable development in Ireland. The literature around Q methodology, the steps to conduct a Q methodology study, as well as discussions around the strengths and weaknesses of the methodological design of this study, are further elaborated in Chapter 3.

Chapter 3 Research Design

This chapter outlines the research design of this study. The study uses mixed-methods approach to investigate participants' perspectives regarding communication around sustainable development in Ireland. The mixed-methods approach is applied to support the administration of a Q methodology design, which is a major part in this study. Q methodology is explorative, interpretative and intensive, suitable for a small numbers of respondents with the operation of factor analysis (Brown 2008). In Q methodology, the researcher presents the participants with a set of items (in forms of statements, pictures, audios, and etc.) regarding a topic. Participants rank the items according to their preferences and individual viewpoints. The researcher then applies factor analysis to the rankings. The correlations between individuals illustrate similar viewpoints or subjectivities (van Exel 2005).

Section 3.1 gives an overview of research methods used in previous studies regarding communication around sustainable development. Section 3.2 introduces the research design in this study: a mixed-methods approach, which includes nine semi-structured interviews feeding into a Q concourse and the main Q methodology study, followed by factor analysis and participants' feedback (see Figure 3.1). The steps to perform a Q methodology study are presented in section 3.3. The chapter ends with section 3.4 on discussions regarding the strengths and weaknesses of the research design.

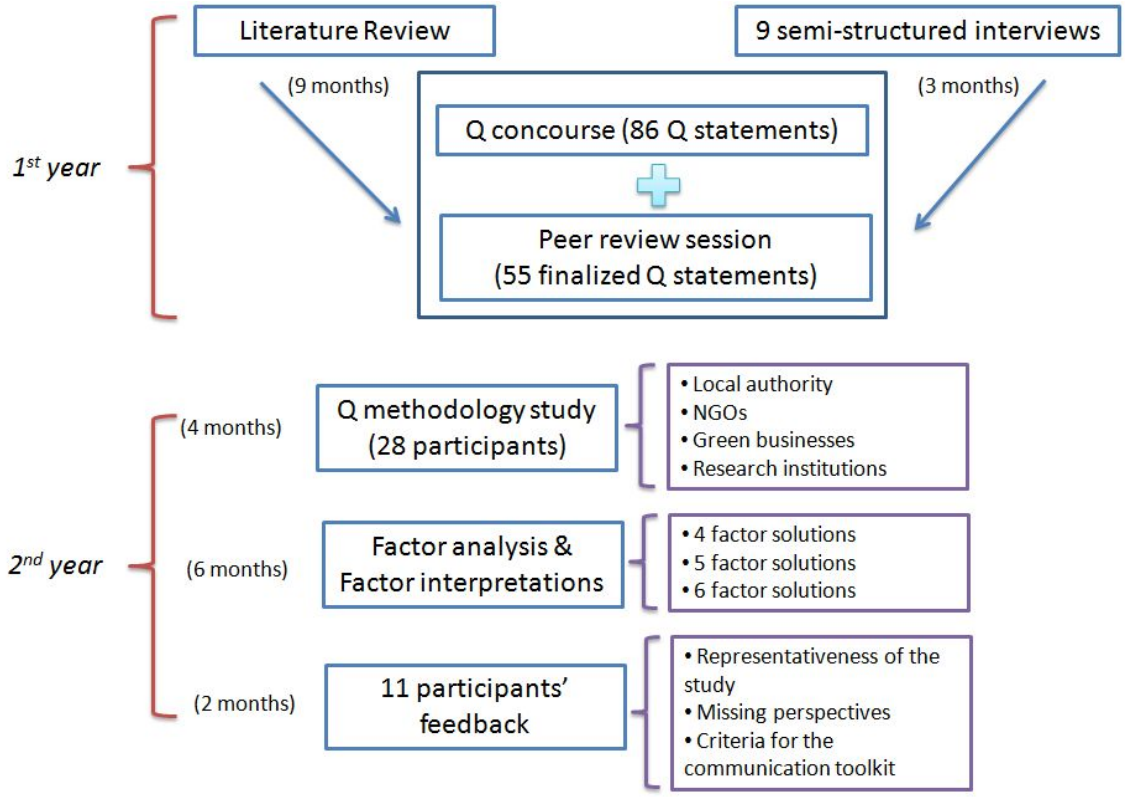

Figure 3.1. Flowchart of the research design

3.1 Research methods used in previous studies regarding communication around sustainable development

Past studies examine communication around sustainable development with various research methods. Examples include discourse analysis, mapping and framework analysis, stakeholder analysis, evaluation studies, case studies, interviews, focus groups and Q methodology. This section examines these various research methods and signals whether they are suitable for the methodological design of this study.

Regarding using literature reviews and discourse analysis to investigate communication around sustainable development, scholars identify various frames, structures and principles to interpret different dimensions in sustainable development. For example, Redclift (2005) uses critical discourse analysis to frame sustainable development as an oxymoron, whereas Sneddon et al. (2005) construct normatively the elements of three main approaches to sustainable development, namely: ecological economics, political ecology, and development

as freedom. Hopwood et al. (2005) apply mapping methodology to combine environmental and socioeconomic issues and also identify visions and principles of sustainability to explore socio-technical aspects overlooked in the sustainable development terrain. These studies provide theoretical insights and critical lens to analyze sustainable development issues. However, whether these meta-level concepts reflect the most prevalent stakeholder perspectives remain questionable. To address the research questions raised in this study regarding how modes of communication between disparate perspectives contribute to the discussion around sustainable development among stakeholders in Ireland , applying discourse or critical analysis would not be suitable. More stakeholder-oriented research designs would be more appropriate.

Case studies, on the other hand, are able to capture perspectives and trends around sustainable development. They are often applied to study public engagement in sustainable development. For example, Ricci et al. (2010) use focus groups to observe how the general public in three regions of the UK understand hydrogen as a 'system innovation'; Vifell & Soneryd (2012) explore two Swedish cases of how the government and parliament shape social dimension in sustainability projects; Coelho et al. (2010) investigate the effectiveness of policy actions by adopting regional sustainable development indicator (SDI) framework to assess a Portuguese case study; Peris et al. (2011) explore how an Analytic Network Process (ANP) could be applied in reflections on the implementations of sustainable development actions in Local Agenda 21 in Benetusser, Spain.

Qualitative research methods are also applied in research around sustainable development. For example, FitzGibbon & Mensah (2012) identify challenges in the water sector in Ghana through a series of interviews with stakeholders. To explore the integration of inter-disciplinary knowledge in sustainable development, Cuthill (2002) conducts eighteen in-depth, semi-structured interviews with citizens involved in local development issues in Adelaide. In the qualitative research project *Environmental Debates and the Public in Ireland* (Kelly et al. 2007), environmental discourses were generated from 22 focus groups to extract a wide range of perspectives.

However, qualitative studies are highly case specific. Achieving validity with highly qualitative research would be challenging, as the researcher needs to eliminate his/her own biases during data collection as well as the interpretation of data. For this study, it would be difficult

to ensure reliability of the research with a case study of disparate stakeholder groups, since results and responses from stakeholders with various profiles would be difficult to compare. Therefore, it is argued in this study that more structured, quantitative elements should also be incorporated into the methodological design to investigate perspectives of Irish stakeholders regarding communication around sustainable development.

Some studies also use evaluations of public outreach science events to measure the effectiveness of communication and investigate the factors that hinder communication between scientists and the public (Wilkinson et al. 2011; Weigold 2001; Ward et al. 2008). However, such studies focus on communication between scientist and the general public. In this study the focus is on modes of communication between multiple stakeholders. Therefore, evaluation study designs would not be appropriate for this study.

Another example of a possible research method is mess mapping and resolution mapping. Horn & Weber (2007) come up with mess mapping and resolution mapping tools to tackle wicked problems. The mess mapping tools are collaborative reasoning tools to assist stakeholders to reach mutual understanding of the problems by providing data that contain various viewpoints and conflicts. Resolution mapping tools are scenario planning where the stakeholders undergo structured and interactive meetings to envision desirable outcomes. While these tools are appropriate for stakeholder communication in sustainable development, the viewpoints and conflicts need to be defined from research. Therefore it is argued in our study that the design requirements of a communication tool for stakeholder communication should be derived from the results of this study to translate research results into practical outputs (see 3.3.7).

A number of studies also apply quantitative approaches to measure motivations of sustainable behaviours. For example, a questionnaire study (Jansson & Biel 2011) examines three distinct samples: investment institutions, institutional investors and private investors. The aim is to identify motivations that guide the investors to consider environmental, social and ethical aspects in their investment decisions. The factor analysis in Q methodology is another effective quantitative approach to explore issues which are multi-dimensional (Donner 2001). Quantitative approaches are advantageous in which they investigate data in structured and objective manners, and are able to tackle large sample of study. However, applying a purely quantitative design in this study would not be appropriate. The research

questions raised at the beginning of this study require qualitative inquiries to tease out the nuances in stakeholder perspectives and in-depth interpretation and analysis of stakeholders' responses.

Existing studies also reveal the advantages of applying stakeholder analysis during the processes of designing communication strategies for more effective representation and involvement of stakeholders in environmental decision-making processes (Reed et al. 2009; Starks & Trinidad 2007). For example, Cuppen et al. (2010) call for structured stakeholder dialogues to articulate various perspectives and underlying assumptions in complex environmental issues. Descriptive, normative, instrumental approaches, and dynamic models of stakeholder analysis have been proposed (Cots 2011; Roberts 2000; Mitchell & Wood 1997; Donaldson & Preston 1995; Freeman 1984) as well as Q methodology to investigate perspectives, values and opinions of stakeholders regarding environmental issues (Cairns 2012; Curry et al. 2012; Cuppen et al. 2010; Niemeyer et al. 2005; Barry & Proops 1999). Q methodology has been applied for environmental policy analysis, including the positioning of stakeholder opinions (Cuppen et al. 2010; Ellis et al. 2007; Breukers 2006; van Eeten 2001).

From examining research methods used in previous studies of communication around sustainable development, it is observed that there is a wide range of approaches. However, most of the studies who apply qualitative approaches examine sustainable development from an analytical and critical perspective. In addition, even though case studies in communication around sustainable development have been used to test theoretical frameworks, there are very few studies using research methods to construct perspectives around the communication of sustainable development. On the other hand, applying merely quantitative approaches might offer too little contextual interpretations. For example, Donner (2001) argues that survey studies have the risk of being oversimplified and rigid.

This brings us to mixed-methods. Mixed-methods have been applied in many studies to investigate perspectives, values and opinions of stakeholders regarding environmental issues (Cairns 2012; Cuppen et al. 2010; Curry et al. 2012; Niemeyer et al. 2005). For example, to investigate stakeholder perspectives, Q methodology is a useful tool which does not force a specific problem framework on stakeholders, but rather generate perspectives from the analysis (van Eeten 2001). Q methodology also has the capacity to tackle single cases and generalise analytical subjectivities and specific contexts (Schrøder & Kobbernagel 2010;

Brown 1994). This research methodology has the potential to provide comparatively reliable and replicable ways of describing the patterns of participants' responses (Davis & Michelle 2011). For example, in Ellis et al.'s (2007) case study of the Tunes Plateau, an offshore wind farm proposal in Northern Ireland, they examine the views of supporters as well as objectors. Ellis et al. (ibid.) argue that the research methodology is able to deliver prerequisite knowledge which generates deliberative responses. Applying Q methodology in our study could be beneficial, in which it could help capture stakeholders' perspectives around sustainable development in Ireland.

Q methodology could be regarded as a form of discourse analysis (Ellis et al. 2007). Discourses refer to how people think, talk about, or represent the world from a particular perspective. For example, in Curry et al.'s (2012) study, they apply Q methodology to identify discourses among stakeholders' views on sustainability in Northern Ireland. In a research investigating responses to climate change, Niemeyer et al. (2005) argue that Q methodology enables a systematic approach to investigate a range of social reactions. Niemeyer et al. (ibid., p.1446) regard Q methodology as ''a powerful analytical tool, capable of producing robust and externally valid results with small samples, factors discernible more effectively through intensive analysis of a small group''. Ellis et al. (2007) further points out that Q methodology is applied in various research areas, including environmental politics. For example, Q methodology has the ability to contribute to the paradigm shifts in policy (ibid.). Q methodology is also capable of seeking beyond sectoral perspectives. For example, the method is useful for stakeholder selection in dialogues rather than selection based on stakeholder sectors (Cuppen et al. 2010).

From examining the various research methods in previous studies in communication around sustainable development, mixed-methods approach consist of both qualitative and quantitative approaches is most appropriate for the methodological design in this study. Q methodology is also considered suitable for investigating stakeholder perspectives in this study. The next section further elaborates on the different elements in the mixed-methods approach, including the literature review, semi-structured interviews, and Q methodology.

3.2 Methodological design of this study: a mixed-methods approach

Mixed-methods research has become more popular in recent years, where integrating qualitative and quantitative research are beneficial (Bryman 2006). For example, Tashakkori & Teddlie (2003) point out that using both qualitative and quantitative approaches in data collection and analysis help generate richer data sets. As data is collected from different research methods, they produce cross-validations for the study and triangulate results (Beneito-Montagut 2011). Mason (2006, p.4) further points out that ''mixed-methods also help us to think creatively and 'outside the box', to theorize beyond the micro-macro divide, and to enhance and extend the logic of qualitative explanation''.

The purpose of applying a mixed-methods approach in this study is to 'triangulate' the qualitative and quantitative results (Creswell 2003; Creswell et al. 2003; Greene et al. 1989). In this study, Q methodology is adopted as a mixed-methods approach due to its ability to recognize and tease out subjectivities of participants regarding perspectives around sustainable development across various disciplines. The qualitative-quantitative mix in Q methodology analysis also enriches the validity of the research. In this study, a sequential data collection method (qualitative-quantitative-qualitative) is applied (Morgan, 1998; Morse, 1991). For example, prior to the Q methodology study, qualitative approaches are taken to prepare the concourse for electing Q statements. A literature review and 9 semi-structured interviews precede the main Q methodology study. Both the literature review and the interviews assist the selection of a Q concourse. The Q concourse consists of a set of Q statements designed for the Q sorting process. Quantitative data is generated during the Q-sorting process. Factor analysis is then applied to analyze the results.

However, there are limitations to mixed-methods. For example, it is challenging to marry various epistemologies and ontologies in a mixed-methods study. At the same time, maintaining consistency of various forms of data and knowledge requires tremendous efforts from the researcher (Mason 2006). Furthermore, as time limitations influence the processes of data collection and analysis, it is challenging for researchers to draw boundaries across what should be and what should not be researched (Brown 2010). Bryman (2006) also

discusses unanticipated consequences resulting from applying multi-strategy research and unpredictable outcomes.

The mixed-methods approach in this study also ensures the validity of the research with an inductive theoretical thrust (Morse 2003, pp.197). This means that this study uses both results from the literature review and the semi-structured interviews to generate frameworks, rather than applying theories deductively from the literature. Sections 3.2.1 and 3.2.2 provide an overview of the role of literature review and the semi-structured interviews in the research design. Section 3.2.3 introduces the background of Q methodology and its methodological strengths and limitations.

3.2.1 The Literature Review

Literature research is essential to the research design (Hart 2001). Integrating literature into the research demonstrates scholarship as well as extending, validating and refining knowledge in the field (Corbin & Strauss 2008). Levy & Ellis (2006) also emphasize the methodological review of past literature as a prerequisite for any academic research. Investigation of the rationales, findings, discussions, and recommendations in past studies also helps to identify trends in the subject of study (Hart 2001). In section 3.1, we summarize research methods used in previous studies of communication around sustainable development and come to the decision that mixed-methods approach with Q methodology is the most suitable research design for our study. In this study, analysis and synthesis of literature provide support around the foundation for the concourse selection in the Q methodology study.

3.2.2 Semi-structured interviews

Prior to the Q methodology study, a series of semi-structured interviews are conducted simultaneously with the literature review. Instead of close-ended interviews where participants are asked to answer a set of standardised questions, the semi-structured interviews allow the participants to discuss issues most significant to them (Curry et al. 2012).

The semi-structured interviews map out participant's perspectives regarding communication manifested around sustainable development in Ireland. These interviews also tease out what participants regard as the most prominent challenges and solutions in communication

around sustainable development. The main goal for the semi-structured interviews is to provide materials for establish a Q concourse for the Q methodology study (see 3.3.1 for definition and structure of a Q concourse). By generating the Q statements from the semi-structured interviews, it ensures that our study is focused on issues raised by the participants, therefore reduces the researcher's bias.

Regarding the sampling method for recruiting participants for the semi-structured interviews, we adopt the 'snowball' sampling method in which existing participants recommend future subjects from among their acquaintances. This sampling method is applied to reach and locate a specific population- stakeholders working in the field of sustainable development in Ireland. These stakeholders are what might be called 'green pioneers', given that they have been actively engaged with sustainable development in Ireland. Most of these stakeholders come from specific sections of the Irish society, such as local authorities, research institutions, NGOs, and local communities. Due to our project resources and planning, we have decided to focus on the final sampled stakeholders in the Dublin region as representatives for the 'green pioneers' in Ireland. Before sending out the initial invitations to the participants, we also drew up a shortlist of potential participants from:

- SEAI (Sustainable Energy Authority of Ireland)
- GCCA (Global Cleantech Cluster Association)/The Green Way
- Dublin City Council
- Fingal County Council
- North Dublin Chamber of Commerce
- Dublin Airport Authority
- DIT (Dublin Institute of Technology)
- Dublin City University (Engineers and scientists in UDRI, Energy Design Lab etc.)
- Dublin City Council (communication experts, project managers)

- NGOs (GAP, Voice Ireland, Friends of the Earth Ireland, and etc.)
- Sustainable development consultants

Participants are invited via e-mails for a 30 minute semi-structured interview (see Appendix C: Invitation to participants). Initially a few participants from research institutions, NGOs, and also stakeholders from *The Green Way* responded to the invitations. After the 'snowball' effect, in which the participants introduced and recommended other stakeholders in related fields, nine participants in total took part in the semi-structured interviews. Table 3.1 shows the demography of participants, including five males and four females. They are from various areas associated with sustainable development, including the local government, engineers at research institutions, members of *The Green Way*, and NGOs in Dublin.

With permission of the participants, the interviews are recorded and transcribed, provided that statements would not be attached to any individual who made them. Each interview takes approximately 45 minutes.

Participant	**Gender**	**Profile Description**
#1	Female	Engineer, research institution, DCU, stakeholder of *The Green Way*
#2	Male	Engineer, DIT, stakeholder of *The Green Way*
#3	Male	Local government, Dublin City Council, stakeholder of *The Green Way*
#4	Female	Irish NGO
#5	Female	Irish NGO
#6	Male	Engineer, research institution, Green Campus, UL
#7	Male	Engineer, research institution, DCU, stakeholder of *The Green Way*

#8	Female	Research & Innovation, research institution, DCU, stakeholder of *The Green Way*
#9	Male	*The Green Way* Director

Table 3.1 A list of participants and their profiles for the semi-structured interviews

Five main topics are addressed in the semi-structured interviews (see Appendix D):

- Participants' perspectives regarding the broad definitions of sustainable development
- Participants' sustainable development agendas in Ireland
- Participants' perceptions of *The Green Way*
- Participant's perspectives around multiple challenges in sustainable development in Ireland
- Participants' perspectives of communication around sustainable development in Ireland

Many of the participants are engineers in the semi-structured interviews. This is due to the fact that our research study is a collaborative project between the communications and the engineering department at Dublin City University. Therefore, we set out to explore the perspectives of engineers at the early stage of our study, while adding more participants through the 'snowball' sampling method. This results in slightly more interviews with stakeholders from the engineering discipline, especially in the semi-structured interviews (4 out of 9). However, in the main Q methodology study, only 5 out of 28 participants are engineerings, with the other participants representing a range of disciplines to ensure a balanced sample of 'green pioneers' (see 3.3.2). Even though nine participants is quite a small sample for the semi-structured interviews, we argue that they would still offer insights to the representations of stakeholder perspectives around sustainable development in Ireland. In addition, we are not aiming to draw any conclusions from the semi-structured interview findings. Rather, the results from the interviews are materials for building the Q concourse for the Q methodology study.

3.2.3 Q methodology

William Stephenson introduced Q methodology in 1935 as an original approach to study psychology. Q methodology has been incorporated into several social research paradigms including social construction, feminism, psychological studies, narrative and discourse analysis, and etc (Brown 1994). Q-methodology offers alternative philosophical approach to research in social sciences (Ellis et al. 2007).

Different from R methodology (traditional factor analysis, in which correlations between cases are analyzed), Q methodology aims to understand a variety of existing perspectives among the population, instead of analyzing how the perspectives are balanced among the population (Cuppen et al. 2010). Q methodology aims to quantitatively encode subjectivities regarding a subject of study. For example, Barry & Proops (1999) identify four discourses with a Q methodology study on the dimensions in sustainability: techno-sceptical, non-green holism; anti-capitalist, techno-scepticism, non-green ecologism; political ecologism; pro-technologism, acquisitiveness. In Curry et al.'s (2012) Q methodology study, they generate four discourses to understand stakeholder views on environmental and resource dimensions of sustainability: one planet living, sustainability through green business and technology, greening government, sustainability via choice editing and incentivising pro-environmental behaviours. In Ellis et al.'s (2007) Q methodology study, they explore supporting as well as objecting views regarding an offshore wind farm proposal in Northern Ireland, where a total of 71 participants took part, sorting 50 statements and resulting in 53 completed sorts. Another example is Niemeyer et al.'s (2005) Q methodology study on *'Assessing responses and thresholds in rapid climate change and society'*, where he identifies four factors: concern, scepticism, action, and apprehension. The discourses and factors generated from these examples show that Q methodology studies are able to capture and tease out subjectivities and perspectives from the participants.

Q methodology provides a foundation for the systematic study of subjectivity, a person's viewpoint, opinion, beliefs, and attitude (Brown 1993). Niemeyer et al. (2005) also regard this method a crucial approach to examine social responses. In this study, Q methodology is considered the most appropriate research method to extract stakeholder perspectives regarding communication around sustainable development in Ireland due to the following methodological strengths:

Q methodology is a ''fundamentally discursive, constructivist approach that combines a strong qualitative dimension with the powerful quantitative tool of factor analysis'' (Davis & Michelle 2011, p.563). Dryzek & Berejikian (1993, p.52) describe Q methodology as a reconstructive methodology which ''builds confidence in its individual observations''. Q methodology allows categories to emerge from data (Brown 1984). Different from surveys and questionnaires where researchers have a prior proposition regarding categories and distinctions, Q analysis determines distinctive categories. The analysis also generates a richer framework compared to purely qualitative research methods such as interviews, focus groups or ethnographic observations (ibid.). In Q methodology studies, the researcher does not make assumptions prior to the study results, or enforce a theoretical framework on the analysis. Rather, one observes the patterns emerged from the data. For example, in Niemeyer et al.'s (2005) study of social responses to climate change, policy issues are used as a behavioral proxy to observe thresholds of adaption to climate warming. Subjective factors are extracted to represent major discourses around scenarios where adaptiveness and maladaptiveness occurs. Barry & Proops (1999, p.338) further point out that one of the strengths of Q methodology study is that individuals actively generate latent discourses regarding a topic:

> The strength of Q methodology is precisely that it allows individual responses to be collated and correlated, so as to extract 'idealized' forms of discourse latent within the data provided by the individuals involved in the study.

In this study, by generating each Irish stakeholder's perspectives around sustainable development, it allows the researcher to generate rich data from various disciplines and construct multifaceted realities. By identifying stakeholder knowledge and values, it also teases out nuances in consensus building around sustainable development in Ireland.

However, there are also several disadvantages to using Q methodology. For example, Cross (2005) points out that it is impossible to collect data in an unobtrusive manner since participants are aware of the research process and they might provide information or modify their responses according to social factors or peer pressures. This is one of the limitations of Q methodology, where the results is unable to reflect absolute objective reality of the participants (Robbins & Krueger 2010). Q methodology studies have also been criticised for the small possibility of generalization in the study results due to having a small sample of

participants in the investigation of human subjectivities (Thomas & Baas 1992). Another concern in Q methodology studies would be the representativeness of the Q concourse, that is, whether different sets of Q statements converge on similar conclusions (van Exel & de Graaf 2005). In addition, factor analysis is not a straightforward task in generating definitive factors to cluster Q sorts, especially when it comes to complex and uncertain issues (Cuppen et al. 2010).

Nevertheless, Q methodology fits well methodologically into the mixed-methods continuum since it shares similar traits with qualitative research while utilizing statistical analyses adopted in quantitative studies (Newman 2008; Ramlo & Newman 2011; Tashakkori and Teddlie 2009). Barry & Proops (1999) regard the qualitative yet statistical approach in Q methodology an effective way to capture a variety of discourses around individual behaviors and perceptions regarding social and environmental aspects. In addition, Curry et al. (2012, p.22) argue that Q methodology is able to construct patterns within and across individuals ''in a way that a questionnaire-based approach, or a purely qualitative approach, would not''. Cairns (2012, p.219) further argues its ''quali-quantitative nature helps bridge the natural and social sciences, and facilitates dialogues between divergent research traditions''.

Q methodology also has the ability to stimulate dialogues in contemporary social theory and research practice (Ramlo & Newman 2011).Q methodology is also one of the approaches for stakeholder analysis in which the researcher's observations intertwine with theoretical perspectives (Curry et al. 2012). For example, Webler et al. (2010) argue that Q methodology studies have the potential to engage stakeholders who have different viewpoints and fill in vital information gaps. Van Exel (2005) thinks that the flexibility of Q methodology generates a sense of control for the participants and increases the reliability of the study, which explores and explains patterns in subjectivities, while at the same time generating new ideas and hypotheses to identify consensus and contrasts in views, opinions and preferences. In this study, Q methodology would be able to capture real-time, cutting-edge perspectives of Irish stakeholders involved in sustainable development.

Q methodology could help classify policy analysts and policy researchers, and empower them with better insights into ''the subjective perceptions of clients and stakeholders, and even themselves'' (Durning and Osuna 1994, Durning 1999, p.403, cited in Curry et al. 2012). Regarding the practical implications of Q methodology studies in environmental policy

making, Barry & Proops (1999, p.344) point out in their study that Q methodology is beneficial for policy making regarding sustainability since it helps identify distinctive discourses suitable or unsuitable for implementing policies:

> If it is possible to identify that certain groups have discourses about nature that are markedly different from other groups (e.g. urban:rural; male:female; rich:poor; etc.), then policy makers will know that policies acceptable in one locality, or stratum of society, may be ineffective or even unworkable elsewhere.

Traditional environmental policy research often take the positivist approach, which is more rigid, seeking an 'objective truth'. Applying Q methodology in this study could help bridge the divide between traditional research approaches (positivist) and post-positivist approaches to environmental policy research (Ellis et al. 2007). Curry et al. (2012) conclude from their study that Q methodology would be beneficial to the development of environmental and sustainable development policy, and that it could ''contribute to better problem identification and definition; estimation and specification of policy options'' (Steelman and Maguire 1999, p. 386, cited in Curry et al. 2012, p.4).

To conclude on this section, Q methodology is a research method with the characteristics of mixed-methods approach. In a Q methodology study, qualitative concourse selection and quantitative factor analysis generate distinctive categories to investigate subjectivities of participants regarding a topic. The literature also shows that Q methodology contributes to areas in environmental policy research. Due to the strengths addressed above, Q methodology is considered most appropriate for this study. In the next section, we will introduce the administration of Q methodology in this study, with step-by-step details.

3.3 Administering Q methodology in this study

This section describes how we apply Q methodology in this study, step-by-step. There are five steps in carrying out a Q methodology study: concourse selection, P (participant) sample selection, Q distribution, Q sorting and factor analysis. Section 3.3.6 & 3.3.7 are additional research designs.

3.3.1 Step 1: Concourse selection

A concourse for the Q methodology study refers to a set of opinions around a topic. ''In Q methodology, the flow of communicability surrounding any topic is referred to as a concourse'' (Brown, 1994, pp.94). The concourse selection is the collection of most appropriate Q items regarding the research topic. The Q items could be in the form of statements, pictures, videos, objects and etc. Brown (1980) also states that any topic consists of only a limited number of distinctive perspectives. By ensuring that a wide range of opinions is covered in the Q concourse, the researcher would be able to reveal these distinctive perspectives. In this study, 55 statements make up the Q concourse (see Chapter 5, Table 5.4). The Q statements describe various perspectives regarding communication around sustainable development in Ireland.

Donner (2001) argues that there is no such thing as 'a perfect set of Q statements'. He further emphasizes that the researcher's job is to investigate the underlying perceptions of the participants in order to grasp insights from their Q sorts. As a consequence, in a Q methodology study, it is important to identify statements that are agreed by some participants while disagreed by some others (ibid.). Donner (ibid.) further points out that in drawing up Q statements, the researcher should also avoid extreme ones. In other words, statements which are likely to be agreed (or disagreed) by everyone should be avoided.

Existing Q methodology studies have used various materials and approaches to generate their Q concourses. For example, in their Q methodology study to investigate discourses in sustainability, John & Proops (1999) conduct structured interviews with a sample of the relevant population to generate a set of statements regarding their subject of study. In his Q methodology study, van Eeten (2001) collects 200 statements from media archives, advocacy papers, interviews and policy reports. In this study, the literature review and the nine semi-structured interviews function as a basis for the selection of the concourse. This ensures the richness of information in concourse generation. Regarding incorporating the literature review into the concourse selection, we take into consideration to sample the most adequate samples of literature from existing theories to contemporary issues (O'Reilly & Parker 2012). Regarding incorporating the nine semi-structured interviews into the

concourse selection, we categorize, cluster and compare similar participants' perspectives to generate the most representative Q statements.

In selecting the Q concourse, the researcher can go for either a structured or unstructured sampling (Watts & Stenner 2012). In a structured sampling design, such as Fisher's (1960), the main subject of study would be conceptualized as parameters. Dryzek & Berejikian (1993) propose a 4 x 4 matrix which contains discourse element and type of claim to generate 16 cells. For example, in Ellis et al.'s study (2007), they use matrix based on Dryzek and Berejikan (1993) for sampling statements from their interview material to construct a Q concourse. In a structured sampling method for the Q concourse, the researcher could apply a deductive or inductive (or both) factorial design (Brown 1996). In a deductive factorial design, categories for choosing the Q statements according to a certain theory (or theories) are designed prior to the selection of Q statements (Stephenson 1953).

However, this study opts for an inductive factorial design for the building of a Q concourse. In an inductive factorial design, there are no guidelines provided for the selection of Q statements prior to the collection of these statements. Rather, the dimensions guiding the selection of the Q statements emerge from the Q statements themselves (McKeown & Thomas 1988, p.28, 30). In this study, after the literature review and semi-structured interviews, a preliminary set of 86 Q statements describing the discourses around definitions, solutions, dimensions, and communication around sustainable development are collected. Categories, associations and and theoretical codes are generated from these Q statements to provide a comprehensive structure for the final selection of the Q concourse. The inductive factorial design for building the Q concourse in this study is further elaborated in Chapter 5.

Normally a Q concourse contains 50-60 statements since having too many Q statements would be almost impossible to operate in a Q methodology study (Watts & Stenner 2012). To reduce the number of Q statements from the preselected Q concourse, we use a peer review session to select the final set of Q statements. The peer review session consists of four researchers in science communication. During a two-hour peer review session, we discuss clarity, redundancy, and representativeness for each of the statements. The aim is to reduce the 86 statements down to a maximum of 60 statements. For statements representing similar viewpoints, we summarize them into one statement to capture the core essence of

the discourse. In the final selection of Q statements, 55 statements are fine-tuned and selected to represent a solid and balanced concourse.

3.3.2 Step 2: P (participant) sample selection

The second step of a Q methodology study is the selection of P (participant) sample. In Q methodology studies, the participants are deliberatively selected for their relevance to the research topic to ensure diversity of the opinions (Brown 1980). In order to have abundant diversity in viewpoints, the focus is on the quality of the P sample rather than quantity (Brown 1994). As a consequence, a Q methodology study requires relatively few participants (12-36) to achieve statistical significance. The sample size is only related to factor stability, which measures the replicability of the factors (Thomas & Watson 2002).

Participants with potentially different viewpoints are usually non-randomly selected (Davis & Michelle 2011). As a consequence, in this Q methodology study, we focus on inviting participants who are familiar with the topic of sustainable development in Ireland to participate. Due to the complex issues teased out from the literature and a large number of Q statements used in this study, the general public are excluded from the Q methodology study to prevent administrative complications. The general public's perspectives regarding communication around sustainable development in Ireland should be a separate study from this one to capture more accurate results.

For pragmatic reasons we again narrow down on participants in the Dublin region. However, to eliminate the risks of omitted views from outside Dublin and ensure that different views are captured is essential in Q methodology. To achieve this, we also included green pioneers in Cloughjordan Ecovillage and Co. Laois. In total there are 7 participants from outside Dublin. First, we invited the nine stakeholders who participated in the semi-structured interviews. Six out of nine participants who took part in the semi-structured interviews agreed to take part in the Q methodology study. Starting with them, we again used the 'snowball' sampling method to locate potential participants. Considering the administration of the Q methodology study and limited time, we aim for approximately 30 participants. In the end, 28 participants responded to our e-mail invitations (see Appendix C). Table 3.2 shows the demography of the selected P (Participants) sample:

Participant #	Gender	Sectors/Professions

#1	F	Research institution/Engineer, Educator, Dublin City University (DCU)
#2	F	Research institution/Engineer, Educator, DCU
#3	M	*The Green Way*
#4	M	Public sector of environment and sustainability , Environmental Protection Agency (EPA)
#5	F	Sustainability organization/Consultant, Cultivate[1]
#6	F	Sustainability organization/Consultant, Cultivate
#7	M	Sustainability organization/Consultant, Cultivate
#8	M	Sustainability organization/Consultant, Cultivate
#9	F	Local authority, South Dublin Chamber
#10	M	Research institution/Engineer, Educator, DCU
#11	M	Local authority, Dublin City Council
#12	M	Research institution/Engineer, Educator, Trinity College
#13	F	Researcher in sustainability, Dublin Institution of Technology (DIT)
#14	M	Public sector of environment and sustainability, Department of the environment Ireland
#15	M	Film industry in sustainability
#16	M	Public sector of environment and sustainability, EPA
#17	F	Independent researcher in sustainability
#18	F	DCU in the community
#19	F	Irish NGO
#20	M	Resident of the Ecovillage
#21	M	Resident of the Ecovillage
#22	F	Resident of the Ecovillage
#23	M	Resident of the Ecovillage

[1] http://cultivate.ie/

#24	M	Resident of the Ecovillage
#25	M	Local community in Co. Laois
#26	F	Local community Co. Laois
#27	M	Politician in the Green Party
#28	M	Research institution/Engineer, Educator, DIT

Table 3.2 The demography of the selected P (Participants) sample

The danger of applying snowball interviewing is that it might reduce the diversity of views captured in a Q methodology. However, from the list of participants shown in Table 3.2, it shows that the 'green pioneers' sampled in our study are from a range of sectors ranging from government bodies, research institutions, community initiatives. From the final analysis (see Chapter 7), we also extracted six distinctive perspectives - showing that the sampling method did not restrict the extraction of viewpoints. Even within the 'green pioneers', and with the possibility that they might be too like-minded, the nuances teased out from our analysis signals the diversity of perspectives captured. However, we can only draw the conclusion that the six perspectives are representative of the 'green pioneers', and not applicable to a larger population. Further studies with more structured and defined sampling techniques are required to validate whether these six perspectives are present.

We would also like to point out here that gender is not a focus in our study. In the raw data and quantitative analysis, we will kept track of the genders of our participants for references but we will not attempt to draw qualitative interpretations on whether the discourses around communicating sustainable development are representing different gender perspectives. However, we did consider, with our best, to ensure as much as possible balanced male/female 'green pioneers' to avoid the danger of favouring male dominated discourses.

3.3.3 Step 3: Forced-choice distribution

In designing the sorting distribution in a Q methodology study, a researcher can either apply a free distribution or forced-choice distribution (Watts & Stenner 2012). A free distribution allows the participants to assign any number of Q statements to any ranking values. Although some literature have pointed out that free distribution strategy is legitimate

(Bolland 1985; Brown 1971), there are quite a few downsides to adopting a free distribution in Q methodology studies (Watts & Stenner 2012). For example, Block (2008) argues that free distribution generates ambiguous comparison of Q sorts and hence provides inconvenient data, less easily processed. Watts & Stenner (2012: 78) further point out that free distribution causes a lot of extra decisions that participants have to make during the Q sorting process, which do not contribute to any significant differences in the factors that emerge from the study.

To achieve pragmatic means of facilitating the ranking process of Q statements for participants and reduce the confusions for participants (ibid 2012), in this study, a flattened, forced Q distribution ranging from -5 (most disagreed) to +5 (most agreed) is designed. Statistically, a forced distribution enables equal means and variances among the Q sorts. Compared to Likert scales in surveys, a forced distribution in the Q sorting process increases the quality of the data since the participants have to make judgment calls according to the relative merit of statements rather than consider each statements individually during the Q sorting process (Niemeyer et al. 2005). That is to say, during the Q sorting process, the participants have to compare each statement with every other statements to complete the process of placing all the Q statements according to the forced distribution.

Table 3.3 illustrates the force-choice distribution by the number of items in each ranking value. For example, for the most agreed ranking value (+5), two Q statements should be allocated. Vice versa, for the most disagreed ranking value (-5), another two Q statements should be allocated, and so on. The complete instructions for completing a Q sorting, including the force-choice distribution (Q score sheet), are attached in Appendix G. There are 55 Q statements in total. In the next step, the Q sorting process, participants are asked to allocate the Q statements according to this distribution on the Q score sheet.

Ranking value	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Number of items	2	3	4	6	8	9	8	6	4	3	2

Table 3.3 Force-choice distribution with the number of items in each ranking value

3.3.4 Step 4: Q sorting and post-sorting interviews

A Q sorting process refers to the action of producing an order of subjects (Dryzek & Berejikian 1993). This is where participants take actions in the Q methodology study. In this study, the Q sorting process refers to the ranking of the 55 Q statements. By sorting these Q statements, participants generate meanings and interpretations around the concourse (Ramlo & Newman 2011). The Q sorting process is communicative and self-referential. By self-arranging the Q statements during the Q sorting, each participant constructs his/her own representation of a reality (ibid.).

Based on the conditions of instructions, this study applies an extensive person-sample (McKeown & Thomas 1988). This means that the Q sorting process for each participant is carried out under an identical condition of instruction. The other type of person-sample is called intensive person-sample, in which participants are asked to go through the process of Q sorting under multiple conditions of instruction. For example, a single case study would adopt the intensive person-sample, where the participant is asked to sort the Q statements regarding a subject of study with different conditions at different times (Brown 1991). An intensive person-sample could be used to capture whether a participant's perspective has changed or remained static over a period of time, or under different circumstances, such as Niemeyer et al.'s (2005) study on social responses to climate change, in which they invited participants to imagine themselves under four different climate scenarios.

In this study, 28 participants are invited to conduct the Q sorting individually. Each statement is printed out on a card for the participant to read. First, we ask them to read the 55 Q statements and roughly sort them into three categories: agree, neutral, and disagree. Next, we ask them to allocate the Q statements according to the force-choice distribution. They begin by choosing two statements that they most agree with from the agree pile and place them under '+5' on the Q distribution sheet; subsequently they pick two statements that they most disagree with and place them under '-5' on the Q distribution sheet. Participants follow this procedure until all of the Q statements are allocated. During the Q sorting process, we give instructions to each of the individual participants to assist the completing of a Q sort. The results of the Q sorts are recorded on paper and also digitally. In total 28 Q

sorts are generated. Detailed instruction of the Q methodology study is attached in Appendix G.

We further carry out post-sorting interviews directly after each Q sorting. The purpose of the post-sorting interviews is to investigate the rationales behind the participants' choices. This helps with the interpretation of factor analysis in the next step. With permission of the participants, the post-sorting interviews are recorded and transcribed, provided that statements would not be attached to any individual who made them. The whole process (Q sorting and post-sorting interview) takes approximately 45 minutes.

3.3.5 Step 5: Factor analysis

Factor analysis consists of a structured set of operations and assists the researcher in making classification of the data sets (Kline 1994). In a Q methodology study, the Q sorts represent variables and statements represent cases, as in an 'inverted' factor analysis (Cuppen et al. 2010). Factor analysis is used to observe latent variables by exploring the correlations of individuals and highlights subjectivities by illustrating similar viewpoints and identify subjectivities (van Exel and Graaf 2005).

In the Q methodology study, we use PQMethod 2.33, a free software package specially designed by Schmolck (2002) to run the factor analysis. We adopt a Centroid Factor Analysis (CFA) to identify and extract salient concepts from the Q sorts (see Chapter 6, section 6.1 for further details on CFA). Although some Q methodologists argue that Principal component analysis (PCA) provide the best mathematical solution and should be applied rather than Centroid factor analysis, studies have shown that both factor extraction methods produce similar results (Harman 1976). Centroid factor analysis also allows more degree of freedom for the researchers to explore factor solutions through theoretical rotation techniques than Principal component analysis (Brown 1980). Watts & Stenner (2010: 99) further point out that ''this [CFA] extraction option leaves all possible solutions open, it allows us to legitimately explore these possibilities through rotation and it enables us to defer a decision about the best solution and the best criteria for making that decision until we have explored the data further.''

The factor analysis in this study with centroid factor analysis is exploratory, which helps to recognize and extract salient concepts from the Q sorts. The discourses extracted from the

statistical analysis do not represent individual viewpoints but rather capture an ideal version of viewing the world (John & Proops 1999). The complete quantitative results of factor analysis are elaborated in Chapter 6 (see 6.1). The qualitative results are elaborated in Chapter 7 (see 7.1 & 7.2).

3.3.6 Evaluation: Participants' feedback regarding Q study results

Most Q methodology studies end after factor analysis and interpretations. However, to validate the research methodology, evaluation studies are needed. For example, Cuppen et al. (2010) presented the six perspectives extracted from their study to participants in a workshop, and discovered a general recognition for the perspectives from the participants. The participants in the workshop also point out that the evaluation study help them identify their position with respect to other perspectives, as well as clarifying the complexity of discourses in the subject of study. In our study, we also evaluate our Q methodology study results by investigating participants' feedback regarding factor analysis results and interpretations (see 7.3.3). Participants' feedback also feeds into the design requirements for a communication toolkit around sustainable development in Ireland (see Appendix A).

Participants who took part in our Q methodology study are invited via email (see Appendix C: Invitation to participants' feedback regarding Q methodology study results) to discuss the Q methodology results. The quantitative factor analysis results and qualitative interpretations of the factors are shared with those who responded to the invitation. The discussions are conducted individually to protect confidentiality of each participant, without revealing information of the details of other participants. During the participants' feedback discussions, we ask them to reflect on whether they agree with the perspectives extracted from the analysis and whether they think that these perspectives capture the current stakeholders' perspectives regarding communication around sustainable development in Ireland. Furthermore, we ask them to identify any missing perspectives from the analysis. The complete list of questions is included in Appendix E.

3.3.7 Requirements for a communication toolkit around sustainable development in Ireland

To translate the academic results into practical output, one of the secondary objectives for our study is to come up with design requirements for a stakeholder communication toolkit around sustainable development in Ireland. During the participants' feedback, we ask participants' opinions on the essentials for a communication toolkit around sustainable development in Ireland. Integrating their discussions and the results from the factor analysis, we come up with some requirements and guidelines to how the communication toolkit should look like. Due to time and funding limitations in this study, the requirements for the communication toolkit needs further elaboration and actualization of a prototype, with future studies to refine and evaluate the proposed guidelines. The requirements of the communication toolkit are attached in Appendix A.

3.4 Strengths and weaknesses of the research design

This section describes the strengths and weaknesses of the research design for this study with the following aspects: the overall design using mixed-methods approach, the semi-structured interviews, the main Q methodology study, participants' feedback, and the design requirements for a communication toolkit. For the limitations in administering the Q methodology study and implications on the study results, please see section 7.4 in Chapter 7.

3.4.1 Mixed-methods approach

Regarding the strengths of adopting a mixed-methods research approach, Briassoulis (2010) and Verhoeven (2007) argue that triangulating qualitative and quantitative methods in research methods could strengthen internal validity, trustworthiness, and empirical validity. Triangulation leads researcher into multiple interpretations rather than what is often expected as a single interpretation (Stake 1995). Mixed-methods approach is advantageous since it captures experiences which are multi-dimensional and combines various perspectives (Mason 2006).

This study administrates the mixed-methods approach through an iterative process to strengthen research validity. Regarding the qualitative approaches in this study, the literature review and semi-structured interviews help generate the Q concourse. The quantitative approach, which is the factor analysis, generates statistical results. The analysis of the study, which combines both the factor analysis and post-sorting interviews, offers multiple interpretations. The qualitative and quantitative data inform each other and

generate layers of interpretations. The participants' feedback further provides a qualitative approach to examine the validity and representativeness of the factor analysis.

There are, however, limitations to mixed-methods approach. Bryman (2006) argues that unless there are concrete rationales for the use of multi-strategy research, there is the possibility of data redundancy, which could be a waste of time and resources for researchers. Mason (2006) also points out that it is more challenging for researchers to conceptualize findings from mix-methods studies since they have to deal with multiple subjectivities.

In this study, there are quite a few challenges around applying mixed-methods approaches. First, translating prominent concepts from the literature and semi-structured interviews into a Q concourse requires both deductive as well as inductive skills to select most representative Q statements. If the Q concourse does not represent the discourses around sustainable development well, it would affect the following Q methodology study. Secondly, since there is limited numbers of Q statements, there exists the danger of missing out some prominent concepts. We also acknowledge the fact that in qualitative designs, the researcher's bias might influence the final selection of the Q statements. Third, the interpretation of the factor analysis is especially challenging since it requires tremendous efforts to examine 28 post-sorting interviews, in addition to interpreting the statistical results from the factor analysis. The factor analysis results in this study generate three possible solutions (four-, five- and six-factor solutions), indicating that there are more than one way to interpret the data. Multiple solutions might also imply that there are overlapping concepts in the results. This is a big dilemma for the researcher, as one would need to make judgment calls based on evidence from multiple sources but risk misinterpretating data.

Although there are many challenges regarding applying mixed-methods approach in this study, the advantages outweigh the potential risks of misrepresenting and misinterpreting data. Throughout the research, we incorporate several evaluation methods to increase the validity of the research. For example, we use a peer-review session to ensure the validity of the Q concourse selection. We also use participants' feedback regarding Q methodology study results to evaluate whether the analysis reflects the most current perspectives around sustainable development in Ireland.

3.4.2 Semi-structured interviews

Regarding the strengths of the semi-structured interviews prior to the main Q methodology study, they generate multiple perspectives of participants from various disciplines. These perspectives are insightful for the generation of the Q concourse, in addition to literature around sustainable development. During the interviews, participants discuss in-depth the issues and solutions around sustainable development in Ireland. These discussions help reflect and identify the most prominent discourses in literature. Furthermore, semi-structured interviews offer more freedom to explore individual perspectives than using surveys or structured interviews. By conducting the semi-structured interviews prior to the Q methodology study, we also gain some insights to the current stakeholder perspectives regarding communication around sustainable development in Ireland. The semi-structured interviews in this study are also similar to pilot studies where they provide preliminary testing of hypothesis and reduce the number of unanticipated problems in the main study.

However, conducting semi-structured interviews is time consuming. It is difficult to ensure the representativeness of the sampled population. In the semi-structured interviews in this study, we apply the 'snowball' sampling method rather than a more structured form of sampling method. The disadvantages of the 'snowball' sampling method is that participants might mislead the researcher to irrelevant targets for study. As the selection process is not random, it also reduces the representativeness of the sampled population. As a consequence, results from the semi-structured interviews might be misleading and result in researcher's bias for selecting the Q statements for the Q concourse.

Nevertheless, the semi-structured interviews in this study provide valuable materials. For example, participants' responses from the semi-structured interviews are compared with literature to generate a better understanding of how discussions around sustainable development is applied in practice in the Irish context. Although the selection process of the participants for the semi-structured interviews is not random, the sub-variants captured from the participants' answers provide qualitative interpretations into how we could construct the concourse for the Q methodology study. In addition, the participants from the semi-structured interviews also became potential candidates for the Q methodology study. During the Q methodology study, 6 out of 28 participants took part in the semi-structured interviews. This also implies that the Q methodology study is in some ways an extension of

the semi-structured interviews. This demonstrate a coherent and consistent approach in the methodological design of this research project.

3.4.3 Q methodology

There are several benefits in applying Q methodology in this study. First, Q methodology captures subjectivities with an objective manner. It has the potential to uncover viewpoints and discourses without imposing predefined categories (Cuppen et al. 2010). Q methodology has the potential to tease out patterns across the sample population in a statistically interpretable manner not achievable by purely qualitative or questionnaire-based approaches (Curry et al. 2012).

Yet the well-defined instruments in administering a Q methodology study ensure the reliability of this methodology. For example, in this Q methodology study, every participants are presented with the same set of Q statements. They ranked the Q statements in the same forced-distribution. Their Q-sorts are then analyzed with the same statistical methods using the same software package PQMethod 2.33. This increases the validity of the research results and reduces researcher's bias, since the researcher does not determine the factor analysis results. Rather, the factor analysis results reflect the participants' Q-sorts. The quantitative analysis in Q methodology study demonstrates the objective manner of approaching subjectivities.

The hybrid character of Q methodology also bridges the gap between quantitative and qualitative methods (Davis & Michelle 2011). Since it is not conventional to apply Q methodology in most communication studies around sustainable development, using Q methodology in this study provides original and innovative perspectives to the mixed-methods approach (Shinebourne 2009). For example, in this study, the Q sorting process enables interactivities between the participants and the Q statements, as well as between the participants and the researcher. This type of interactivities is not achievable through survey studies, media or content analysis. In addition, having a set of Q statements for the ranking process draws boundaries to the study rather than having a too 'opened' approach such as relying merely on interview results or qualitative case studies. As a consequence, the quantitative-qualitative mix of Q methodology study fits well with the mixed-methods approach in the methodological design of this study.

However, the representativeness of the selected Q statements remains questionable, especially if the researcher wants to generalize the results to another population. The sampling method used in recruiting participants for the Q methodology study (snowball sampling) might results in an unbalanced selection of participants. With only 28 participants from 4-5 sectors taking part in the Q methodology study, it is questionable whether the participants represent a complete range of perspectives regarding communication around sustainable development in Ireland. The initial stage of the Q methodology design, namely coming up with a concourse of Q statements, is very time consuming and intensive (Frantzi et al. 2009).

Another weakness in applying Q methodology in this study is its limitation in capturing longitudinal perspectives. In this study we only capture a cross-sectional sample of participants' perspectives. As a consequence, future studies are required to look into quantitative, large-scale surveys to generate more data, or in-depth, qualitative exploration on one specific sector to tease out sub-perspectives within a major perspective type extracted from this study.

3.4.4 Participants' feedback regarding Q study results

As emphasized earlier in this chapter, most Q methodology studies end after factor analysis and interpretations. In my study, we incorporate participants' feedback sessions regarding the Q methodology study results as part of the methodological design to investigate the representativeness of the six perspectives identified in the study. There are several benefits as well as fallbacks to this approach:

On the plus side, the participants' feedback ensures an iterative process of the study since participants are asked to evaluate on the results. Participants' feedback help confirm or defy the six perspectives generated from the Q methodology study with their rationales. This reduces researcher's bias and unnecessary speculations for concluding the study. The feedback discussions also allow the researcher to test the validity of the Q methodology study results and exchange ideas with the participants for drawing up the design requirements of the communication toolkit.

On the down side, doing such evaluation requires additional organization and administration of time and efforts after the factor analysis and interpretations. During the feedback

discussions, the researcher also has to be fully aware of confidential issues and keep the factor analysis results anonymous. In addition, since there are only 11 participants taking part in the feedback discussions, it is questionable whether their responses could be generalized to the whole sampled population (28 participants). Nevertheless, the participants' feedback sessions could be perceived as an evaluation method for the Q methodology study design. The questions asked during the feedback sessions could also function as guidelines for evaluating Q methodology studies in other research disciplines.

3.4.5 Requirements for a communication toolkit

The requirements of the communication toolkit (see Appendix A) offer guidelines for designing a communication toolkit for practitioners in the field of sustainable development. The toolkit could help translate the study results into pragmatic communication strategies and links theoretical concepts with practices.. It is also possible to apply Q methodology on other case studies in stakeholder perspectives regarding sustainability issues and design tailor-made communication strategies and guidelines most suitable for stakeholders. There are huge potentials in further developing the toolkit, with evaluation studies and collaborations with designers and communication experts to refine the design. A prototype of the communication toolkit needs to be actualized and evaluated to test whether it offers valuable guidelines for practitioners. Also, due to a small number of participants in the Q methodology study and even smaller number of participants in the participants' feedback discussions, it is questionable whether the requirements of the communication toolkit could be generalized to an external sample population. Nevertheless, the design requirements for the communication toolkit is a segway for future applications from the results of our study. The requirements could offer a starting point for researchers to consider the potentials in linking communication theories with practices in the areas of stakeholder communication around sustainable development.

The next chapter, Chapter 4, presents the findings from the nine semi-structured interviews regarding stakeholder communication around sustainable development in Ireland. These findings feed into the inductive factorial design for the Q concourse building in the Q methodology study, presented in Chapter 5.

Chapter 4 Stakeholder Communication around Sustainable Development in Ireland: Findings from Semi-structured Interviews

This chapter presents stakeholder communication around sustainable development in Ireland from the findings of nine semi-structured interviews which takes place simultaneously to the literature review at the beginning of this research project, prior to the main Q methodology study. We would like to emphasize again that the purpose of the semi-structured interviews is to assist the researcher in building a Q concourse for the main Q methodology study via understanding perspectives of Irish stakeholders around sustainable development in Ireland. We would also like to emphasize that the small sample of nine participants from the semi-structured interviews is adequate for this purpose since we do not aim to draw any assertions from the semi-structured interviews, but instead aim to tease out the most prevalent discussions around stakeholder communication regarding sustainable development in Ireland. These discussions will feed into the materials for the inductive factorial design for selecting the Q concourse (see Chapter 5).

Through a 'snowball' sampling method, nine participants took part in the semi-structured interviews and discussed five topics around sustainable development in Ireland. These five topics are drawn from the literature chapter to provide discussions around prominent issues around sustainable development in Ireland. Participants are asked to share their perspectives around these topics during the semi-structured interviews in an open, elaborated manner. Each interview took approximately 45 minutes. The interviews are recorded and transcribed with permission of the participants, provided that statements would not be attached to any individual who made them.

During the semi-structured interviews, participants discuss how they interpret the broad definitions of sustainable development in Ireland (4.1), their sustainable development agendas in Ireland (4.2), their perceptions of *The Green Way* (4.3), their perspectives regarding the different challenges in sustainable development in Ireland (4.4), and their perspectives regarding communication around sustainable development in Ireland (4.5). The

nine participants taking part in the semi-structured interviews are from various disciplines related to sustainable development in Ireland (see Chapter 3, Table 3.1 for the list of participants). To ensure confidentiality of the participants, they are numbered (#1 to #9) when mentioned in this chapter. Section 4.1-4.5 elaborate on participants' responses to the five topics in the semi-structured interviews. Section 4.6 discusses how their responses shape the Q concourse presented in the next chapter, Chapter 5.

4.1 How stakeholders interpret the broad definitions of sustainable development in Ireland

Literature points out that sustainable development is perceived as a global trend for various stakeholders in the societal and political sphere, including policy makers, industry, the public and NGOs (Rave et al. 2009; Berggren 1999). However, literature also shows that definitions around sustainable development could be abstract (Parris & Kate 2003; Redclift 2005). Having abstract definitions for sustainable development could be destructive for environmental decision making process in Ireland if policies around sustainable development are ambiguous. At the same time, having divergent understandings of sustainable development in the Irish context might result in very fragmented policy efforts. In order to identify and underpin various perspectives around the broad definitions of sustainable development in the Irish context, at the start of the the semi-structured interviews, participants were invited to describe how they define sustainable development.

4.1.1 Brundtland's definition (1987)

Most participants refer to Brundtland's definition (1987), in which sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Participants' perspectives on the Brundtland's definition of sustainable development is later incorporated in the Q concourse (see 5.1.1, A1).

Participant #5, who represents the NGOs perspective in Ireland, argues that the core definition of Brundtland is the best fit for communicating the concept of sustainable development, since sustainable development is about long-term development and taking the

future into consideration. She believes that it is the only definition that could reach out to people and convince them about the values of humanities:

> I think it is the only definition that would be acceptable by people who needs to be convinced about sustainability and in terms of communicating sustainability I think it is the best that we can use because there are lots of people that are, that don't even agree with long-term development. (#5)

Participant #5 also addresses the idealized notion of nature where people are disconnected with the nature. There is a lack of public value regarding sustainability in Ireland. She points out that ''the attitude gap- that's a big one. For example, the willingness to pay, for example organic items, free-range items, is low''. She further addresses the difficulty of measuring environmental impacts, saying that nature is somewhat invisible compared to our economic growths and disruptions:

> Nature is something invisible compared to our economies and disruption. The values are not something that could be counted. In the current system it is hard to see with the singular focus on GDP as a measure of success. You can have a lot of economic activities and people would consider that a success. Nature is kind of invisible at the moment. (#5)

Participant #2, who is one of the stakeholders from *The Green Way*, states that sustainable development should leave the planet a better place for future generations rather than the current state. He also addresses energy solutions in relation to preserving the ecological system:

> There are all kinds of definitions. I think it all comes down to ideas of how you put it and the idea of leaving the planet better than you found it, and that leads to ideas of efficient use of energy, clean water, some ideas of preserving ecology, the sphere, etc. (#2)

Participant #2's discussions around the definitions of sustainable development also implies that abstract thinking without concrete solutions in sustainable development is not suitable for Ireland. At the same time, technological solutions could be the key to long-term sustainability. Participant #2's assertion on technologies as means to provide solutions also

indicates a techno-optimism perspective, where innovations and technologies would solve sustainable development issues.

Regarding the disconnection between perceptions and behavioural change in sustainability, participant #2 also states that people don't normally connect their actions, such as electricity usage to environmental consequences, and consequently they are not committed to the environment. The biggest challenge would be inducing real behaviours as opposed to changing attitudes, since changing attitudes does not necessarily leads to changing behaviours:

> You question people and they are generally positively exposed to sustainability. But the real action is not that way, regarding public transport, houses, etc. People don't necessarily see there's a contradiction between behaviours and energy use. They are even not committed. They don't carry through. So the biggest challenge is how you influence real behaviour as opposed to changing attitude. Changing attitudes does not lead to changing behaviours. (#2)

4.1.2 The contested nature of sustainable development

Some other participants focused more on the complexities and dimensions in sustainable development when they were asked to share their perspectives around sustainable development definitions. These dimensions are later captured in the Q concourse (see 5.1.2, B2). For example, participant #3 from the local government states that the broad areas of sustainable development comprise multiple and dynamic definitions which are context, situation and timeframe (current society versus future generation) dependent. Participant #3 also points out that the majority of the society is not switched onto sustainability. People regard sustainability as something very abstract: ''the vast, bulk of the society is not really switched on to sustainability and it's not something that they can directly get involved with''.

Another example is defining sustainable development with integrative dimensions. Participant #1, an engineer at a research institution, emphasizes that three dimensions (environment, economic, social) should fit well with one another. Unlike participant #3, participant #1 refers sustainable development in Ireland being 'the latest trend'. However, she points out that the majority is unsure about what exactly defines sustainable development. She argues that it should entail a social movement where the society will

gradually adopt a sustainable lifestyle and sustainability concepts will become embedded in people's psyche, as part of a social norm. However, she points out that the current society is very reactive towards sustainability:

> It [sustainable development] is the latest trend. it will be replaced by something else eventually but it's the trend at the moment. People are aware of the environment, of what's right and what's not right. And you hope that over time it will become embedded in people's psyche so that it has to be the central thing and inherited part in what we do. (#1)

A general observation from the participants' responses in connection to the environmental aspect shows that sustainable development is regarded as a solution to mitigate impacts on the environment and slowing down energy degradation. Regarding the societal aspect, people and value are judged important. However, in respect to the economic aspect, there are different arguments. Some argue that economic growth creates opportunities for sustainable jobs in Ireland. For example, those who favour economic development being a priority in sustainable development argue that the economic dimension helps drive the other two dimensions (environment and society). However, participants with counter-arguments affirm that economic or GDP development shouldn't be emphasized and incorporated in sustainability. For example, participant #7, who is an engineer at a research institution, argues that sustainable development is not about GDP development, but is about using resources on this planet more efficiently to slow down consumption and degradation:

> It [sustainable development] is not GDP development. It's about using resources on this planet to create better life and be sure that, possibly, to slow down consumption and degradation. I mean energy degradation. Let's say that sustainable development is a development that slows down these processes and you allow to leave us with relative, let's say, peace and health in the longest term possible, for all generation possible in the end. (#7)

One participant (#4) from an Irish NGO points out that the term 'sustainable development' is too vague and intangible to be fully grasped or understood by the general public. She argues that it is difficult for people to apply the abstract ideas in sustainable development into their daily lives. "Sustainable development might come across us a little bit more intangible for people to get its meaning. So we would like to call it sustainable living- to make it more real

for people,'' she states. Consequently she thinks that more bottom-up, small-scale sustainable projects are preferred, as compared to the more top-down, policy-driven development projects.

It could be concluded that participants' responses to the definitions around sustainable development reflect the complexity of discussions in the literature chapter, especially around the ambiguity of sustainable development concepts and the three pillars. The majority of the participants (except for participant #4) identify with Brundtland's notion of preserving resources for future generations. They also regard the notion of sustainable development quite complex, entailing multiple dimensions. Despite disagreements around whether economic development should be prioritized in sustainable development, in general participants' perspectives regarding the broad definitions of sustainable development are not heterogeneous. Participants' responses regarding the definitions around sustainable development also contribute to the Q concourse (see 5.1.1).

4.2 The diversity of stakeholder agendas around sustainable development in Ireland

To get a picture of the various practices around sustainable development in Ireland, during the semi-structured interviews participants are also asked to talk about their own institutional or organizational sustainable development agendas. The various agendas of sustainable development from the nine participants include: energy solutions, economic objectives, corporate strategies, research purposes, and everyday value and culture.

Participants from research institutions state that improvement of the environment such as creating sustainable ways of using natural resources, developing technologies to substitute for fossil fuels and measuring carbon footprint, are all part of their sustainable development agendas. For example, participant #1, an engineer at a research institution explains that in her areas of research, sustainable development involves more than just the broad concepts of sustainability. The implications and new techniques in solving energy problems require excessive evaluations, for example life cycle analysis to breakdown products and consider waste treatment. Her practices in sustainable development also contain a lot of evaluations on the impacts and implications of waste management technologies:

> What I've been doing is bringing in a lot of life cycle thinking. What we do is looking at water waste treatment. So you have to be able to say that the new one is better than the other one and what kinds of implications are there for the environment, the new techniques. So rather than just saying that this new technique works, it could probably damage the environment even worse. You know you have to ask questions about what impacts it has compared to other technologies and what are the breakdown products and where does the wastes go when you generate it- is it straight into the water, the way you collect it, is it recycled or whatever. When these questions come in, it's more than just the technology itself. (#1)

Participants from *The Green Way* argue that creating jobs and developments that are cost-effective are the main focuses for their organizations. One example would be the local government's sustainable development plan, which aims to align various aspects of sustainable development from different counties under sustainable development guidelines and via public consultations. Participant #3 from the local government explains that the sustainable development agenda represents the core values in the local government's sustainable development plan:

> Each of the development plans is essentially a summary of what each of the country is thinking, about future development. It is a very useful resource. You can imagine the city merging- there will have to be consultation, and there will have to be alignment of bringing in the different ways that they are thinking. So the sustainable development plan is useful as it provides some guidelines in some ways- who we are, what it is that we believe. (#3)

From research institutions, participants mention sustainable funding, sustainable development education programs and research initiatives. On the other hand, NGO participants point out that people and culture, sustainable living, community engagement and empowerment are the main drivers for their sustainable development agenda. For example, participant #4 from a NGO mentions that they build capacity with local community leaders, who would then drive the sustainability activities forward:

> We give them certain information, encourage them to take action. They come back and they feedback to us in a very positive way. And what you end up having actually is peer-lead program. So you actually have individuals learning from each other.
>
> We do that by building capacity with those organizations and they could kind of continue with our work so individual leaders, like resident leaders, would become leaders in the community. We also have leaders in the community that would take on that green or sustainable living agenda. (#4)

To conclude, each participant's sustainable development agendas in Ireland are very specific. Although most participants mention or emphasize the importance of having multiple sustainable development dimensions during previous discussions around the broad definitions of sustainable development, the sustainable development agendas in their work fields are not in line with the ideal integrative sustainable development models that they depicted.

4.3 Participants' perceptions of an Irish sustainable development initiative- The Green Way

The Green Way is a cleantech cluster in Dublin with the aim to achieve synergies in knowledge and expertise in the areas of green economy. It was established in 2010, with various collaborating partners including the government, research institutions, and the industry. *The Green Way* is used as a case example in the semi-structured interviews to stimulate discussions around Ireland's sustainable development efforts.

4.3.1 The green economic opportunities and challenges from *The Green Way*

In the semi-structured interviews, three participants are stakeholders from *The Green Way*, a Cleantech cluster in Dublin region. However, during the semi-structured interviews, participants who are not stakeholders are also invited to express their perceptions of *The Green Way*. Participant #2, who is a collaborator in *The Green Way*, argues that it is a very different type of initiative than previous green initiatives in Ireland. In *The Green Way*, stakeholders are cross-sectoral and they might have overlapping agendas. "It is a different kind of initiative that involves actors who don't sit in the same sectors. It's also cutting across

what some sectors are already doing,'' he states. Participant #9, another stakeholder of *The Green Way*, mentions the technological and economic aspects of the initiative, such as creating more job opportunities and engagements with Cleantech innovations:

> Well it is a certain type of job. And that shift will automatically create other things as well. So that shifts the way from dirty technologies to clean technologies, that, will create jobs, move Ireland towards economic competitiveness, and will, as a consequence, improve the environment, improve the socioeconomic outcomes. (#9)

During the semi-structured interviews, participant #9 also addresses the core focus of the initiative being economic savings and commercial opportunities for the Irish green industry. Therefore, he expects the government's policy supports to leverage competitiveness and communication in Cleantech. He further emphasizes that the agenda of *The Green Way* is economically driven rather than socially driven:

> The biggest challenge in sustainable development In the Irish context is probably policy. There are far too many departments, agencies and authorities responsible for different aspects of sustainability or the green economic agenda. What it needs is a single champion to grasp the strategic opportunity.
>
> We have in Ireland a great opportunity the natural resources that we have here: the educated workforce. Our scale of interest, since half of the population lies in the area of Leicester and geographically it is the size of a small county or province in China. But there are things we have, like the wind resources which is the best in Europe. We have ocean energy resource, which is perhaps the best in the world. We have, R&D capabilities in the universities, which is world-class. We have highly educated workforce. Ireland could be the centre for green tech, clean tech operation. Why wouldn't we be able to develop a Silicon Valley? Find scenarios of innovation, target it, strategically support it and cherish it, leverage them, commercialize them...it just needs someone to give it a champion. (#9)

Different from the other participants who argue for more social debates in sustainable development, participant #9 strongly believes in the benefits of Cleantech for Ireland. He points out that the current market for Cleantech in Ireland is constrained and finite. There exists opportunities for Ireland to become testbeds for technologies, goods and services:

> The market for Cleantech in Ireland is constrained and finite and small, because of our population. So the opportunity for Cleantech in Ireland isn't about making goods and services that can be deployed here. It's to use Ireland as the testbeds for technologies, goods and services that could be deployed everywhere. So, um, yeah, that's always been the case, like in pharmaceutical, or medical devices, or digital technologies...Ireland has always been a jumping off point as opposed to a destination. And that probably affects what we communicate what our objectives are. We want to trail things and we want to test them, attract companies in, because of the opportunities to commercialize, here. But the end target is to sell (#9).

4.3.2 Stakeholder communication challenges in *The Green Way*

However, participants from NGOs express their opinion on the lack of engagement of *The Green Way* with NGOs. Participant #4 from an Irish NGO points out that the initiative does not seem to include NGOs in their agenda, and perhaps the NGOs should be more proactive in approaching stakeholders in *The Green Way*:

> It [*The Green Way*] has come across my desk a few times, and from people who I've been dealing with regularly. We are very much on the edge on it and I don't know a huge amount of the program and the clean tech side. I don't know what efforts they made to engage NGOs and we have certainly not been spoken to by anybody in *The Green Way*. It's kind of like a second-hand information that we have picked up on. Maybe we need to be more proactive from our side. (#4)

Participant #5 further addresses the fact that *The Green Way* initiative is very much dependent on funding to get interested parties to build synergies. For participant #7, the initiative is attractive especially in the transport sector. He is expecting that a new transportation system would effectively connect the north and south side of Dublin. ''It [*The Green Way*] is a very interesting concept, particularly the transportation part. I would like to see how they would build a system that goes north to south, more effectively than now'' he points out.

However, some participants argue that there is a challenge in the positioning of different roles for various stakeholders. For example, participant #8 offers her opinions on the strengths and weaknesses of research institutions participating in *The Green Way*. She points

out the capacities of research areas in sustainability as strengths, but nevertheless the lack of consolidation for sustainable activities internally remains a weakness:

> How much communicating about green things are we actually doing on this campus? Or at least make sure that one of the stories and items that go up on our front page is something in the sustainability area. I can't say that there are many related things or...no, that's very low key...it's not something that's on the radar. It's just not generally talked about on this campus. (#8)

Participant #8's discussion responds to van Passel's (2008) reflections on the danger of Cleantech being perceived as a 'buzzword' rather than a technological solution. During the semi-structured interview, participant #8 also points out that research institutions should approach the transitions into 'green' institutions gradually, by underpinning research proximities with industrial partners.

To conclude, most participants regard *The Green Way* a promising initiative for Dublin. However, they also point out several challenges for the initiative, including the lack of centralized Irish policies in Cleantech, the need for more engagement of NGO stakeholders, as well as efforts in the mobilization and engagement of more collaborators through champions.

4.4 Multiple challenges for Ireland to achieve sustainable development

Literature (see 2.2.3) signals the unbalanced relationship of society and nature (IPCC 2013), the challenges of communicating the complexities around science and technology (van Eijndhoven 1995), and the neglect of cultural aspects in sustainable development (Norgaard 1988). During the nine semi-structured interviews in our study, these issues from the literature are addressed to investigate participants' perspectives across two major barriers in Ireland: technological ones and societal ones. Technological barriers refer to the most prominent environmental issues in Ireland; societal barriers refer to cultural impediments such as the lack of awareness across the general public regarding sustainability.

4.4.1 Participants' discussions on technological issues around sustainable development in Ireland

When participants are asked to identify the biggest technological issues in sustainable development in Ireland, most of them mention climate change, with related issues such as waste, water, and energy. Some of them also regard technological solutions as the most efficient means to tackle these problems. Two major aspects associated with technological issues in Ireland are energy conservation and water. For participant #7, the technological aspects of sustainable development should focus on providing energy solutions and products free from fossil fuel, and use mostly renewable resources. ''Sustainability is about providing solutions-energy solutions and products as much as possible free from fossil fuel and that use mostly renewable resources'' argues participant #7.

However, participant #1 argues that there should be more efficient ways to achieve technological goals in sustainable development than existing solutions, whereas for participant #2, a lot of technological solutions have been researched and developed in Ireland. He thinks that there are a lot of barriers for the adoption of new technologies, for example electric cars. The current infrastructure is based on gas stations that supply gasoline, which is not adaptable to the new system:

> There are a lot of things that could be done, and a lot of them are being done. They are being developed, they are being researched. There's a challenge in adoption that a system in any kind tends to fall into favour in the current technology because it is what you have and that creates barriers to the new adoption of new technology [ex: solar power stations, electric cars]. (#2)

He further states that there is no one-size-fits-all panacea for sustainable development since the concept of sustainability is translated into different modalities for particular industries and areas: ''sustainable development solutions don't fit neatly in a box. You could pull down the concepts to a club of particular industries and areas selling their strong identities, but you should think how to communicate the concepts''.

Participant #5 approaches the barriers in sustainable development from another angle. She thinks that developments in sustainability are very reactive in Ireland, especially when

human resources are limited. She further points out that the national sustainable development strategies only respond to global strategies such as Rio +20:

> Unfortunately a lot of it [sustainable development efforts] is a bit reactive- because we don't have the resources to strike out and devote ourselves to get a certain campaign through. There are things that we would like to do, but we don't have the resources and we will end up finding that we are reactive, having to respond to things that are happening, for example, Rio+ 20. (#5)

Discussions from these participants (participant #2, #5, #7) contribute to integrating dimensions and solutions in the Q concourse (see 5.1.2, B2). On the other hand, regarding societal issues, participants mention value, perception and awareness at collective and individual levels. They point out the lack of sustainable value and culture among the general public in Ireland. The majority are reluctant to change their existing unsustainable behaviors. The general public is indifferent to environmental impacts, especially in the current economic downturn. Even for those who are aware of sustainability, there remains an awareness-action gap which hinders people from performing sustainable actions.

Participant #3 argues that the public needs to feel included in sustainability initiatives. This could be achieved through open innovation and collaboration between experts and non-experts. ''Up until this point whenever people feel that there's an issue in the partnership, people feel that they are excluded. Once people realized that's happening people will try to open up. There's a lot of ideas around open collaboration, open innovation,'' he points out.

For participant #6, collaboration brings different disciplines together to investigate the social aspects in sustainable development as well as the technological aspects. Collaboration enables critical thinking, especially when different stakeholders are trying to understand how different areas are tied together in the sustainable development perspective:

> They [different disciplines] have to try and understand how these different areas are tied together in the sustainable development perspective. So that's good, it's interesting. It's a very good networking opportunity to meet people who are interested in the same things but are from completely different disciplines. (#6)

Participants' discussions regarding collaboration between various disciplines and discussions around the challenges of public engagement in sustainability respond to literature around knowledge capacity from multidisciplinary efforts (see 2.3.2) and public participation in science (see 2.2.2). The collaboration of stakeholders, social inclusions, and the gap between awareness and actions in sustainability are later captured in the Q concourse (see 5.1.1, A2 and 5.1.3, C1).

4.4.2 Participants' discussions on societal issues around sustainable development in Ireland

From the semi-structured interviews, participants also discuss the neglect of societal problems in sustainable development. For example, participant #1 points out the lack of societal debates in sustainable development. She states that people put a lot of emphasis on the technological aspects in sustainable development but often fail to consider the broad picture of society. Participant #1 further states that technological issues could be resolved easily but not public misconceptions and discords:

> You can solve technical problems-you can get it more efficient...but you never get the answer people want, the points that people object. To get people on your side or to get people persuaded is not that easy. (#1)

Participant #3 holds similar viewpoint to participant #1. He points out that 80% of sustainability concepts are obvious to all people, which includes all the technological aspects, such as low-carbon approach, forecasting, backcasting, etc. The other 20 % of sustainability concepts are values and cultures which are highly sophisticated, for example public understanding of sustainability issues:

> I think 80% of what sustainability is remains obvious to all people, and the other 20 % are values, cultures. So the technical, the natural steps, the carbon, strategic approach, abcd approach, backcasting, etc. are easy to understand. The biggest challenge is trying to get everyone to speak the same language and to understand the same approach (#3).

Discussions around the neglect of societal problems mentioned by participant #1 and participant #3 show that Ireland needs to put more efforts in public engagement in

sustainability. At the same time, building consensus around values and cultures in Ireland contribute to understanding public perspectives.

For participant #7, on the other hand, public's lack of knowledge in sustainable development is a key issue. As an engineer in a research institution, he feels responsible to communicate to the public the difference between sustainable products and unsustainable ones. He also addresses the lack of awareness in the limitation of technological developments: people always assume that the industry is able to provide a perfectly 'clean solution', but fail to recognize that there are still a lot of technologies and innovations at early stages:

> Well, the average person doesn't know squat about sustainability, but they shouldn't know because it's a very technical thing. But what we [engineers] should do is to educate people about what's different- what's used in the past is worse, what's been used in the past is over, it's not sustainable. People always assume that the industry can have perfect cleaning, but there are a lot of things there just starting to emerge. (#7)

Participant #7's response imply that environmental education in Ireland needs to be improved. This is later captured in the Q concourse (see 6.3, Table 6.4, statement 53).

Participants also emphasize the need for creating economic opportunities as well as ensuring social equity and transparency in sustainable development by distributing benefits and profits fairly. For participant #2, social issues in sustainable development should emphasize on the access to information, access to choices, and public decision making. He says that it really comes down to transparency and participation to ensure social equity:

> I think there are social equity issues. Ideas in sustainable development tend to be founded on ideas of transparency of information and social equity, and in many places, Ireland included, there wouldn't necessarily be the cases of social transparency or social equity that would enable certain measures to take place.
>
> So social issues- you might see issues like urban form, access to information, access to choices, public decision making, decision in that. There are a lot of things, but it really comes down to transparency, participation, and social equity not being as

> developed in the past or a successful, coherent one. It requires consistent approach. (#2)

Participants' discussions around social equity respond to OECD's (2009, Chapter 1, p.17) recommendation of improving the rights and obligations to accessing environmental information in Ireland. This is captured in the Q concourse (see 4.1.2, B1).

Participants also point out that the societal dimension in sustainable development requires genuine, meaningful participation from local communities, and making them feel that they are part of the environmental decision making process. However, participant #4 from an Irish NGO points out that achieving community participation is sometimes challenging since the funders of NGOs might misrepresent the needs and demands of people and miss out the key elements within the community. Therefore she feels that it is essential to listen genuinely to the people for their demands:

> We are also trying to listen to their demands. Our funders- they might say that they are representing their needs and demands of people but that's not necessarily the case. All the big agencies, sometimes they miss out what are the key demands and needs within the community. That's what we do-we actually listen genuinely to the people what they are saying, their demands. And I suppose as in sustainable development it has to bring forward genuine, meaningful participation, and people feel that they are part of the process, so that they are included in the decision making process. (#4)

Coming from the university's perspectives, participant #6 points out that sustainable development should be demonstrated via operations on campus and beyond. He especially says that practices and cultures matter a lot, and not just the abstract concepts of sustainable development:

> Well, I suppose from the university's point of view, it [sustainable development] must be much more integrated into the operational works and even beyond. Although some people say that the impacts of these are small and there are bigger issues to focus on, I still think that practices and cultures matter a lot. (#6)

His comment on sustainable development being ambiguous respond to literature pointing out the definition of sustainable development being abstract and oxymoronic, as well as the disconnection of the general public with sustainable development (see 2.1.2).

To summarize the differences between technological issues and societal issues in sustainable development, participant #7 states that the current society is facing a huge transition from fossil fuels to alternative energies. However that is only the technological aspect. To make people understand how solutions are viable and feasible would require investigation into social behaviours:

> The fact is that we have to move a gigantic market, a gigantic perception, from fossil fuel to something else. We have to make people understand that solutions are viable, and feasible in a very short period of time. When we view it in a social part it is very different from a technical side. (#7)

The emphasis on social behaviors imply that there is a shift from techno-driven policy approaches to behavior-driven policy approaches in sustainable development initiatives. More efforts is needed to investigate patterns of sustainable and unsustainable consumptions. This is later addressed in the Q concourse (see 5.1.1, A1).

Responding to literature around unbalanced dimensions in sustainable development (see 2.1.3), participants also have concerns for the lack of coherent linkages in different sustainable development dimensions in Ireland. For example, regarding the connection between environmental and economic dimensions, participant #6 thinks that the financial crisis and recession in Ireland is demonstrating unsustainable economics while resulting in social harms, despite the fact that there are opportunities for technologies and innovations to provide solutions in sync with political, social and financial means. Participant #6 further points out that Ireland needs to figure out how the economy can serve in a more sustainable way. Unfortunately, the conversations are only about getting back to growth. He also points out that the environmental and economic pillars are very disconnected at this moment:

> The bottom line is that we are not working out how our economy can serve in a sustainable fashion at all. The conversations are only about getting back to growth. I can see that getting back to growth will solve some of the problems of economic and social aspects but not the environmental part. I think that the environmental agent

> doesn't explain how the economy should serve society very well either. I think that these two (environmental and economic pillars) are very disconnected at this moment- the overlapping parts are missing, even more missing than it has been in the past. (#6)

Participants also mention fragmented policies around sustainable development in Ireland as a social barrier in achieving sustainable development. For example, participant #9 argues that the environmental departments, agencies, and authorities are responsible for different aspects of the sustainable or green economy agenda, but there is a lack of a single champion to drive cross-departmental efforts with strategic approaches. Participant #9 further points out that Ireland needs a single champion to master cross-sector perspectives:

> We have too many interests and good projects and good initiatives which get stopped for the wrong reasons. And no one has the overall control of the agenda. In the UK you can see they have the environmental department called climate change. I think Ireland needs something similar to this, from the job perspective, from the environmental perspective, socio-economic perspective, from research-development perspective, from an academic-learning perspective. And drive the country in a strategic direction that everyone understands what we buy in to. (#9)

To sum up on participants' perspectives around the technical and societal barriers in achieving sustainable development in Ireland, participants identify several key aspects and challenges. Regarding technological issues, participants mention developing alternative means to use our resources, the adoption of new technologies and more proactive sustainable development strategies. Regarding the societal issues, several participants point out that the societal issues are often overlooked when compared to technological issues. However, participants have different viewpoints regarding the priorities in societal issues, such as public education and engagement in sustainability, equity and transparent information, and more centralized policies.

4.5 The status of communication around sustainable development in Ireland

Literature signals the importance of identifying stakeholder perspectives, building capacity with multidisciplinary communication, and developing effective strategies for stakeholder collaborations (see 2.3.3). To understand how modes of communication manifest around sustainable development in Ireland, participants are asked to discuss their perspectives around current potentials and challenges in communication around sustainable development in Ireland. The majority of the participants mention communication incentives, communication strategies, communication languages, and communication effects.

4.5.1 The challenges in stakeholders' conflicting interests

Most of the participants regard creating sustainable development incentives a major challenge in Ireland. This is because each stakeholder has different priorities which do not necessarily reconcile with other stakeholder's sustainable development agendas, since each stakeholder agenda in sustainable development is very specific (see section 4.2). Communication to the public regarding sustainable development issues is challenging in Ireland since communication around scientific issues often remains quite detached from public's experiences. Participants point out that since there's a common lack of awareness among the public regarding environmental issues, simply informing people about sustainable development issues without any efforts to engage and interact is not an effective communication strategy.

Participant #6 argues that it's very hard to incorporate sustainable development concepts into people's daily lives. Thus he thinks that subtle actions and enabling people to formulate their own opinions regarding sustainable development could be useful. He proposes that the main communication objective in sustainable development should be achieving an outlook that everyone feels that they have responsibilities to contribute. Therefore he argues that communication around sustainable development should emphasize on the accumulation of 'small' actions:

> It's very hard to put these[sustainability concepts] into people's agendas. So that's why I think subtle things can help. Because if you just enable people to form opinion

about something or identify in a certain way, that might work. I think what we have to do, what should happen is that at least there should be an outlook which makes people feel that they are somehow responsible for the environment- to form awareness. And at certain crucial moments you evolve in certain ways or you just make a statement that will persuade others. Simple things matter because they accumulate. (#6)

4.5.2 Tailored communication strategies for different type of stakeholders

On the other hand, some participants are quite optimistic regarding the current status of sustainable development in Ireland. For example, participant #3 points out that there are movements towards transitions and resilience, although they are still in niches. She says that hopefully niche ideas and opinions around sustainability would evolve and be made persuasive to many others.

Participant #5 from a NGO's perspective, especially points out that the most challenging part in communication around sustainable development is communicating to communities who are not interested. She thinks that it is important to mobilize those who aren't interested in sustainable development:

> The most difficult part is access to communities that are not interested. For example, people who attend the workshops, they are already interested, and know what you are going to be talking about. But it is the people who aren't there that needs to be engaged with. So the first step is the hardest. (#5)

Participants from green businesses point out that communication strategies are challenging regarding promotional communication propositions and unique selling points. For example, participant #8 points out that on the national level, marketing Ireland as a Green country requires communication strategies to make Ireland's sustainable development activities visible:

> I've always found that what we could do in Ireland is to market ourselves as a green island. You know, we are small and we do have a high standard of production and I always feel strongly in the food and production area. We could see it at the moment that it's the one thing that is growing- our exports, our food and farming projects.

> And it would have been very, very nice if anybody, anywhere around the world if they would have something that is Irish in their hands and they would immediately feel that this is a green product. (#8)

Participant #8 points out a communication barrier for experts, which is the lack of holistic understanding of other experts' areas. She thinks that this is due to research institutions often being very 'closed-up' with their own agendas and as a consequence fail to recognize the benefits of multidisciplinary collaborations with other stakeholders. She also mentions the barriers in collaborations due to information overload and redundancy of information:

> Even just by gathering what information is out there and if I happen to be talking to one researcher I can just go: did you know that professor X or Dr. Y is doing this and...because it is very difficult for researchers, even though they are staying in campus, to know what other researchers are doing. (#8)

The challenges in community mobilization, public engagement, and communication strategies mentioned by participant #5 and participant #8 around sustainable development are captured in the Q concourse (see 5.1.3, C2).

When it comes to communication 'languages' around sustainable development, participants identify difficulties in multidisciplinary communication. They point out that the academics and experts in industries speak different languages even though they are both working in the sustainable development field. For example, participant #2 concludes that communication in sustainable development is not a 'one-size-fits-all' model since different target audience needs different communication messages. The notion that there is no such 'one-size-fits-all' panacea for sustainable development models is also captured in the Q concourse (see 5.1.1, A3).

Regarding integrative communication approaches in sustainable development, participant #3 says:

> As well as the bottom-up it needs also the top-down, you know, regulation. So for example the EU trading scheme. If that becomes more tightened, then fuel becomes more expensive, then it not only allows people to make choices themselves but also make those who don't make the choices to still do the right thing. Approaches in

> sustainable development should go both ways and that there's a sweet balance in the middle. But I think that we are quite far away on either side. (#3)

Participant #4 from the NGOs perspective argues that the bottom-up approach is a practical one, which shows people how to live sustainably while empowering them to take actions. Unfortunately, she points out that Ireland is not doing great in either top-down sustainable development approaches or bottom-up public engagement. Discussions around bottom-up and top-down approaches in sustainable development are also included in the Q concourse (see 5.1.2, B2).

4.5.3 The impact of communication around sustainable development

From the semi-structured interviews, participants also discuss the impacts of communication. They point out the need for evaluating the effectiveness of communication languages around sustainable development. They think that communication languages should be able to deliver recognizable impacts equally to legislative regulations and policies in sustainable development. Regarding effective communication in sustainable development, participant #7 states that communication experts could provide their expertise in various forms (oral, written) for communicating sustainability to the public:

> Our (academic) communication is foggy, messy and there are so many theories. We don't go to the core of the concepts, because we were told that complex issues are important and as a result we don't communicate. Effective communication includes the use of methods in oral and in written form. (#7)

Participant #8 argues that we often use one or few words too casually to express the whole concept of sustainable development, whereas we should think more in depth of what we really intend to communicate about.

Participant #9 from *The Green Way* regards the challenge of sustainable development communication associating to the targeted audiences and how they relate to the objectives of the sustainable development initiatives. Participant #9 uses *The Green Way* as an example and points out that successful communication should aim to create recognizable benefits for all industrial stakeholders and companies:

> Well, it depends on who you are communicating to. So for example, the measure of success of our communication activities and lobbying activities is for them [the industries and companies] to recognize that the green way is an initiative that they can explicitly support, and potentially with funding resources behind. So yes, you know, what successful communication looks like for *The Green Way* no longer being in the ownership of the six partners but as a national initiative. Another definition of successful communication is that all of the industry bodies, all of the industry stakeholders, and all of the companies have a clear understanding of what the benefits of the green way could be for them. And I guess the final measure of communication and strategies is creating jobs- that's the way that we will look at it in the next five years- jobs and innovations, company formations. (#9)

Effective communication strategies in sustainable development discussed by participant #7, #8 and #9 are later captured in the Q concourse (see 5.1.3, C3).

Trust is another issue discussed by several participants. For participant #7, there exists mistrust in the general public towards the academia. He points out that this is due to the fact that the technological part of sustainable development is complex. Therefore communication language used in the academia towards the public needs to be simple:

> People are really trying to understand what we[engineers] are doing, because they don't trust academia, or they just don't know what we are doing because the technical part is complex. So the communication between the academia and the public need simplification. (#7)

He further expresses the importance of public feedback and crowd sourcing in sustainability issues, since the general public could provide additional perspectives. In Ireland, argues participant #7, there is a discrepancy between the users and producers of technologies. This put the public authority in an awkward place. He also says that the relationships and dynamics between the public, public authorities and the industry are very different. The public is in general indifferent unless they are unsatisfied regarding the technology; the industry are funders of projects and therefore the relationship between the industries and public authorities is intricate:

> The public authorities are elected by the citizens, so they should in a way interpret the citizens but they can't because the issues are quite complex and usually a failure. So we [engineers] have to communicate to the public authority and the people tied to them. Knowing that people will not disturb you, unless you do something that's really, really bad. We [engineers] have to identify, and communicate to people in a positive way, that new technologies require importance. There are things that are negative, for example when consumers feel that they are being cheated, betrayed, or kept in the dark. (#7)

To sum up, regarding the status of communication around sustainable development in Ireland, participants discuss a range of issues, including public's lack of awareness for sustainability issues and the challenges in developing effective communication initiatives to engage the local communities. Participants also point out the necessity for more strategic communication to market a 'green' Ireland. Integrating top-down policy driven and bottom-up community driven approaches are equally important.

4.6 Concluding remarks on the results from the semi-structured interviews

Results from the nine semi-structured interviews in this chapter inform the generation of a Q methodology concourse in the next chapter. As we pointed out several times in this chapter, the findings from the nine semi-structured interviews are linked to the inductive factorial design for the Q concourse (see Chapter 5, Table 1, 2 and 3). From participants' discussions in the nine semi-structure interviews and reflections on how their discussions respond to literature, some final remarks are drawn up:

Despite the totality of sustainable development definitions from participants' responses regarding their interpretations of sustainable development in Ireland, it also reveals the limitations in sustainable development agendas to incorporate the multiple dimensions in sustainable development. The limitations in the sustainable development agendas reflect the fragmented nature of sustainable development in Ireland. The inability to translate the ideology of sustainable development into actions is also captured in participants' responses. From the literature, both Reid (1995) and Redclift (2005) point out the difficulties in achieving efficacy and practical application of sustainable development on the ground level,

implying that the broad sustainable development definition is by all accounts powerless to address micro-level problems.

From the semi-structured interviews, participants reveal that some of their organizations focus on multiple agendas, while others have more singular, specific sustainable development purposes, implying that accommodating 'complex' tasks in sustainable development could be challenging. Despite consensus in the accountability of Brundtland's definition among most participants in the semi-structured interviews, it appears that the definition lacks the ability to address complexities and contradicting stakeholder agendas. More research is needed to investigate how various stakeholders reconstruct and redefine the concepts of sustainable development in Ireland. A major category of 'sustainable development definitions' is included into the Q concourse, looking at existing definitions and additional requirements for sustainable development in Ireland (see 5.1.1).

Regarding discussions around *The Green Way*, there exist discrepancies among participants' viewpoints on the utility of Cleantech innovations, especially among those who are directly involved and those who feel excluded. The differences in viewpoints illustrate some deficits in the current stakeholder communication around sustainable development initiatives in Ireland, where the communication model remains exclusive.

Regarding the technological challenges in sustainable development, the major issue is the lack of infrastructure to accommodate new options around sustainability in Ireland. However, it could be observed from the participants' responses that there are greater challenges in the societal aspects. The current sustainable development model in Ireland does not allow fruitful discussions and contemplations in societal debates. The majority of the public is not committed to sustainability due to lack of opportunities and incentives. These societal problems in sustainable development show that issues around sustainable development in Ireland are heterogeneous. Heterogeneous issues require various stakeholders to strategize appropriate solutions. To capture how stakeholders strategize around heterogeneous sustainable development issues in Ireland, a second major category of 'sustainable development dimensions & solutions' is included into the Q concourse (see 5.1.2).

Regarding communication around sustainable development, multiple approaches range from institutional, collective engagement activities, to creating individual incentives. Regardless of

the different discussions and emphasis on top-down, macro scale communication strategies, bottom-up strategies, or the business and Cleantech approaches, communication around sustainable development in Ireland requires effective strategies. One wonders then, what really defines effective communication around sustainable development? Is it about the ideology and values behind the philosophical approach of safeguarding a sustainable future? Is it an outlook with concrete goals? Or is it a process of integrating environmental, social and economic dimensions?

From the participants' responses in the semi-structured interviews, they did not point out specific criteria for what constitute an 'effective mode of communication in sustainable development'. This indicates that the main Q methodology study needs to further identify different types of perspectives regarding sustainable development dimensions, solutions, and most importantly, how to recognize the strengths and weaknesses regarding stakeholder communication around sustainable development in Ireland. To answer the questions addressed in the previous paragraph, the Q methodology study also needs to identify modes of communication. Thus, another category 'communication around sustainable development' is incorporated into the Q methodology concourse (see 5.1.3).

The next chapter, Chapter 5, presents the inductive factorial design for the Q concourse, which explains the selection process of the Q statements. We observe recurring patterns from the Q statements collected from the literature (Chapter 2) as well as the nine semi-structured interviews from this chapter, and define three major categories: sustainable development definitions, sustainable development dimensions and discussions, and communication around sustainable development. Subcategories are also defined. The preselected Q statements, the associations between the subcategories and the final list of 55 Q statements for our Q methodology study are elaborated in Chapter 5.

Chapter 5 Inductive Factorial Design for the Q Concourse

The main goal of this chapter is to present the Q concourse for our Q methodology study. A Q concourse is made up by a set of Q items which broadly represent various perspectives (Watts & Stenner 2012). To build a Q concourse, the researcher collects statements from all the discourses from interviews, media analysis and literature review, attempting to collect all possible statements that respondents might make about the subject (van Exel & de Graaf 2005).

In this study, both the literature review (see Chapter 2) and the analysis of semi-structured interviews (see Chapter 4) are materials for the preselection of a Q concourse in this study. The preselection of the Q concourse refers to a collection of Q statements that might be suitable for participants to administer the Q sorting process (see 3.3.1 & 3.3.4). The preselection of the Q concourse in this study generates 86 Q statements (see Appendix F). However, to make the Q sorting process manageable, the final Q concourse aims to contain only maximum of 50-60 Q statements (Watts & Stenner 2012).

An inductive factorial design is applied for the selection of the Q concourse in this study (see Chapter 3, section 3.3.1). That is to say, we did not use any particular theories or categories prior to the collection of the Q statements to generate the Q concourse, as in the case of a deductive factorial design (McKeown & Thomas 1988; Stephenson 1953). Rather, we examine recurring patterns from the Q statements collected from the literature and the nine semi-structured interviews. These Q statements are categorized, and the associations between these Q statements are identified to generate 12 theoretical codes. Theoretical codes describe the substantive interrelationships among concepts (Glaser 1978). The theoretical codes provide guidelines to the final selection of the Q concourse in this study.

This chapter illustrates in detail how we deduce the Q statements and build a Q concourse, as well as how we observe the patterns and associations inductively from the data and come to the final 55 Q statements (see 5.3, Table 5.4). Section 5.1 describes categories emerged from a collection of Q statements drawn from the literature review and nine semi-structured interviews. Section 5.2 elaborates on the associations between each of the categories and

generates 12 theoretical codes for the selection of the Q concourse. Section 5.3 presents the final selection of the Q concourse with 55 Q statements (see Table 5.4). Discussions around the limitations of applying an inductive factorial design in the selection of a Q concourse is further discussed in Chapter 7 (see 7.4.1), among other limitations in our Q methodology study.

5.1 Categories and subcategories emerged from the collection of Q statements

In the preselection of the Q concourse for this study, two sources are taken into consideration: literature review (see Chapter 2) and nine semi-structured interviews (see Chapter 4). The analysis of the nine semi-structured interviews is conducted simultaneously with the literature review. The literature review help inform the analysis of the nine semi-structured interviews. Both the literature and the nine semi-structured interviews are materials for the collection of Q statements. We adopt an inductive factorial design for building the Q concourse in our study. This means that there are no pre-determined dimensions or guidelines prior to the collection of the Q statements (McKeown & Thomas 1988). Instead, the categories guiding the selection of the Q statements emerge from the statements themselves. We also take into account Maxwell's (2005) suggestion of qualitative data analysis in the following steps: first, break apart the data; secondly, rearrange it into categories; last, observe emerging themes. This step-by-step approach helps the researcher recognize gaps in the literature and teases out recurring patterns (Koenig 2006). The inductive factorial design of the Q concourse selection in this study is carried out in four steps:

Step 1: we collect and formulate a set of statements to summarize prominent findings in the literature review as well as the nine semi-structured interviews. These statements are then clustered into categories;

Step 2: we categorize statements from each category into 4-5 subcategories. This step aids us to identify associations between the statements;

Step 3: we identify potential associations (causal relationships, inter-dependencies, hierarchies, conditions, and etc.) between subcategories, and generate theoretical codes for selecting the Q concourse;

Step 4: a peer review session helps trim down and finalize the Q concourse from 86 Q statements to 55 Q statements, which are manageable for participants to perform the Q ranking process.

The following subsections present **Step 1** and **Step 2** in the inductive factorial design of our Q concourse selection in this study. We demonstrate how we observe the patterns and categorize the Q statements into three main categories: A. Sustainable development definitions B. Sustainable development dimensions and solutions, and C. Communication around sustainable development. For each category, subcategories are also identified.

5.1.1 Category A: Sustainable development definitions

Discussions around sustainable development definitions from the literature (see 2.2) and semi-structured interviews (see 4.1) generate 23 statements. To further distinguish how sustainable development definitions would be constructed in the Q methodology study, we identify four subcategories: what sustainable development entails (A1), requirements for sustainable development (A2), beyond defining sustainable development (A3), and limitations of sustainable development definitions (A4). Table 5.1 shows the list of 23 statements and supporting literature/semi-structured interviews.

Subcategory	**Statement and supporting literature/semi-structured interviews**
A1 What sustainable development entails	A1-1 Sustainable development is about developments in different dimensions. (Freedman 2012; Joachim 2010; Lopez & Toman 2006; van Eijndhoven 1995; The Sustainable Society Foundation (SSF); Interview #7)

	A1-2 Sustainable development is about reaching mutual understanding on what developments should be. (de Haan 2011; Rave et al. 2009; Craig 2007; Berggren 1999)
	A1-3 The idea of sustainable development is intangible. (Barry 2007; Parris & Kate 2003; Interview #1)
	A1-4 Brundtland's definition best defines sustainable development (meeting the needs of the present without compromising the ability of future generations to meet their own needs) (Sneddon et al. 2006; Castro 2004; WCED 1987; Interview #3)
	A1-5 Sustainable development is the latest trend in Ireland. (Saha & Darnton 2005; Interview #2)
	A1-6 Sustainable development is also about personal manifestation. (Interview #1, #2, #4)

	A1-7 There is a shift from techno-driven to social behaviour-driven approaches in sustainable development. (IPCC 2013; Redclift 2005; Ahmed & Stein (2004)
	A1-8 The concept of sustainable development is clear to the general public. (Kelly et al. 2007; Interview #1, #2)
A2 Requirements for sustainable development	A2-1 Sustainable development needs to address social capitals and collective efforts. (Peris et al. 2011; Coelho et al. 2010; Kim 2007)
	A2-2 Sustainable development should not be regarded merely an ideology. (McKeown 2002; Interview #1)
	A2-3 The 'future' is an important element in the discussions of sustainable development. (Neumayer 2003; Parris & Kate 2003)
	A2-4 More than the aspect of 'future' needs to be addressed in sustainable development.

	(Redclift 2005; Interview #5)
	A2-5 Discussions around sustainable development should contain multiple stakeholder agendas. (Voinov 2007; Kate et al. 2005; Lehtonen 2004; Rittel & Webber 1973; Interview #2)
	A2-6 Issues and contributions in sustainable development should be defined. (Interview #2, #4)
	A2-7 There are quite different perspectives around sustainable development in Ireland. (A Framework of Sustainable Development for Ireland 2011; OECD 2009)
	A2-8 Values around sustainable development are not yet created, especially the gap between retro and reality (attitude-action gap). (Scholderer & Frewer 2003; Interview #2, #3, #4).
	A2-9 Sustainable development should tackle the fragmentation of stakeholders.

	(FitzGibbon & Mensah 2012; Roberts 2000; Carley & Christie 1992, p.174)
A3 Beyond defining sustainable development	A3-1 There's no such thing as 'one size-fits-all' solutions in sustainable development. (Voinov 2007; Sneddon et al. 2006; Key 1999; Adams 1990; Interview #4, #5, #8)
	A3-2 Deliverables are crucial in the current world when it comes to sustainable development. (Olsen 2012; Barry 2007; Lehtonen 2004; Carvalho 2001; Rittel & Webber 1973)
	A3-3 Ireland needs a sustainable development revolution. (Barry 2012; Lehtonen 2004; Interview #8)
A4 Limitations of sustainable development definitions	A4-1 Sustainable development problems are 'wicked problems'. (Cuppen et al. 2010; Redclift 2005; Roberts 2000; Reid 1995; Rittel and Webber, 1973; Interview #3)
	A4-2 The current definition of sustainable development does not fully explain what sustainable development is.

	(Barry 2007; Hopwood & Mellor & O'Brien 2005; Kate et al. 2005; Lehtonen 2004; Clark & Dickson 2003; Parris & Kate 2003; Interview #1)
	A4-3 The concept of sustainable development could be misused, for example, greenwashing. (Cooper 1997; Berggren 1999; Interview #2, #9)

Table 5.1 A list of statements regarding A. Discourses on sustainable development definitions

The following sections (A1-A4) discuss the subcategories of sustainable development definitions by summarizing participants' responses from the semi-structured interviews and key points in literature.

A1. What sustainable development entails (A1-1 to A1-8)

Eight statements present what sustainable development entails, including the shifts in sustainable development models as well as the elements, cultural perspectives, and the broad definitions of sustainable development.

These statements also illustrate complex sustainable development issues from the literature, which refers to global perspectives (de Haan 2011) and collaborative efforts of policy makers, industry, the public and NGOs (Rave et al. 2009). The shifts in sustainable development models include the transition from old, traditional development models towards new development models, for example the integrated three-pillar model. In the past, economic growth theories dominate conservative development models, whereas the current development model focuses on the socio-economic sphere (López & Toman 2006). The current development model takes into account environmental and societal aspects. There is also a shift in the relationship between technologies and sustainable development, moving from a bottom-up approach to a systemic approach of expert input. One good example would be the Intergovernmental Panel on Climate Change (IPCC 2013).

During the semi-structured interviews, participants also discussed structural elements of sustainable development and multiple dimensions such as the 3Ps (people, planet, profit), SDGs (Sustainable development goals), and principles of sustainability. Participants also discussed cultural perspectives in sustainable development. There are discussions around whether sustainable development is the latest trend in Ireland, and whether personal and individual manifestations exist.

A2. Requirements for sustainable development (A2-1 to A2-9)

Nine statements describe four elements in sustainable development definitions: developing an outlook, identifying problems and causes, incorporating social capitals and collective perspectives, and creating individual values for achieving sustainable development goals.

While some of the participants in the semi-structured interviews, for example participant #1, call for an outlook for sustainable development with an emphasis on the 'future', some argue for more emphasis on the current crisis. Participants also point out the necessity for sustainable development definitions to be more inclusive of the general public. This responds to social capitals and collective perspectives in sustainability activities proposed by Coelho et al. (2010) and Peris et al. (2011), in which mobilization and incentives in sustainable development should ensure public engagement (Kim 2007).

The lack of values regarding sustainability in Ireland is addressed in the semi-structured interviews, for example the unwillingness to pay more for organic and free-range food. However, some participants think it is a matter of public's reluctance to change since habits are very hard to break. If people are used to doing things in a certain way, for example, using plastic bottles instead of bringing a mug, it's very difficult for them to switch to a new form of behaviour.

From an institutional point of view, participants argue that people often practice being sustainable at their institutions, under the influence of organizations and peers. Unfortunately they do not carry them outside of their institutions. For example, students might recycle at school but not at home. It is argued that creating individual incentives for achieving sustainability are much harder than collective incentives.

A3. Beyond defining sustainable development (A3-1 to A3-3)

Three statements discuss the necessity of moving beyond the existing definitions of sustainable development: dynamic solutions tailor-made for various stakeholders; concrete implementations of sustainable development; a revolutionary paradigm of designs, goals, processes and actions for sustainable development globally and nationally.

from the literature, many scholars emphasize on how sustainable development should accommodate concrete yet dynamic solutions. For example, Adams (1990) argues that in practice, sustainable development activities show diverse visions. The diverse visions in sustainable development is captured in the semi-structured interviews, where participants point out that it is challenging to accommodate the agendas of different types of stakeholders.

Literature also points out that there is a danger of stakeholders associating sustainability without recognizing implications (Voinov 2007). In the semi-structured interviews, participants discuss system changes in sustainable development. They mention that one of the challenges in system changes is how to make use of the current resources to meet the needs for the new systems. Although Ireland is wealthy in terms of resources, people are sheltered from environmental impacts, they are quite indifferent to natural resources and environmental consequences.

A4. Limitations of sustainable development definitions (A4-1 to A4-3)

Three statements identify the limitations of sustainable development definitions: the misuse of the ideology of sustainable development; the deficits in the current definition of sustainable development; the 'wicked' nature in sustainable development issues.

From the literature, scholars point out that there are limitations of sustainable development definitions. Sustainable development has 'complex and ill-defined problems with conflicting components' (Rittel & Webber 1973). Roberts (2000) contributes the complexity of sustainable development problems to social causes, whereas Redclift (2005) argues that the Brundtland definition is merely an oxymoron. From the semi-structured interviews, several participants also discuss the factors feeding into the complexity of sustainable development issues. For example, the technological dimension in sustainable development in Ireland is too dominating, which results in greenwashing. Corporations in Ireland sometimes use

sustainability merely as a marketing strategy. Even though they are contributing to the environment, sustainability is not the main driver.

Regarding the misuse and abuse of sustainable development, the word 'sustainability' is frequently quoted but people mean different things. People use 'sustainability' without taking into consideration the next steps. In addition, debates around sustainable development in Ireland are marginal. Ireland needs to take a step back and contemplate on the core values for the society. Regarding evaluating the success in sustainable development, participants consider it difficult since there are multiple dimensions in sustainable development, and some can be quite abstract to measure.

5.1.2 Category B: Discussions on sustainable development dimensions and solutions

Discussions around sustainable development dimensions and solutions from the literature (see 2.3) and semi-structured interviews (see 4.2 & 4.3) generate 17 statements. To further distinguish how dimensions and solutions around sustainable development would be constructed in the Q methodology study, four subcategories are generated: localizing solutions; integrating solutions and dimensions; developing evaluation indicators; the economic approach. Table 5.2 shows a list of statements from B. Discussions on sustainable development dimensions and solutions and supporting literature/semi-structured interviews.

Subcategory	Statement and supporting literature/semi-structured interviews
B1 Localizing solutions	B1-1 Sustainable development actions should be localized rather than centralized. (OECD 2009; Craig 2007; Lehtonen 2004; Cuthill 2002; Miller 2001; Fischer 2000; van Eijndhoven 1995; Interview #4)
	B1-2 Social inclusion and empowerment in local

	communities are essential in addressing sustainable development. (Craig 2007; Interview #2, #4, #7)
	B1-3 Empowerment and network are crucial drivers for creating individual incentives for sustainability. (Kim 2007; Voinov 2007; Lawrence 2006; Swindall 2000; Tanner 1999; Farrington 1998; Interview #4, #6)
	B1-4 The public stakeholders should have access to information and resources regarding sustainable development. (Steurer 2005; Jansen 2003; Interview #2, #7)
B2 Integrating solutions and dimensions	B2-1 Sustainable development issues require multi-stakeholder discussions to assist decision-making. (de Haan 2011; Rave et al. 2009; Kate et al. 2005; Macnaghten et al. 2005; Cuthill 2002; Logan 2001; Kochan 2000; #3)
	B2-2 Environmental objectives should be linked to economic necessities in sustainable development.

	(Barry 2007; Redclift 2005; Lehtonen 2004; Parris & Kate 2003; Cooper 1995; Norgaard 1988)
	B2-3 There are tensions between policy-driven (governance) and market-driven approaches in sustainable development. (IPCC 2013; Neumayer 2003; Roberts 2000; Interview #7)
	B2-4 Solutions for sustainable development should include a combination of cost-effective political, social and financial aspects. (Sneddon et al. 2006; Hopwood et al. 2005; Wynne 2005; Jansen 2003; McKeown 2002; Interview #2)
	B2-5 Both individual and collective drivers are essential for solving sustainable development issues. (Coelho et al. 2010; Hasan 2010)
	B2-6 Multiple dimensions, models and perspectives should be integrated into sustainable development. (Barry 2007; Redclift 2005; Lehtonen 2004; Parris & Kate 2003; Cooper 1995)

	B2-7 Both top-down (government-driven) & bottom-up (local initiatives-driven) approaches should be taken to solve sustainable development issues. (Peris et al. 2011; Hansan 2010; Coelho et al. 2010)
	B2-8 Technological drive could be a solution for sustainable development, for example Cleantech. (OECD 2014; GCII 2012; Ernst & Young 2011; van Passel 2008; Clift 1997; Interview #8)
B3 Developing evaluation indicators	B3-1 Evaluation and proper auditing is necessary for sustainable development. (Vicente & Partidário 2006; Interview #1)
	B3-2 Measurements for the success of sustainable development should be developed. (Kate et al. 2005; Lehtonen 2004; Interview #5)
B4 Business approach	B4-1 There are a lot of economic opportunities for going 'green'.

	(OECD 2014; Knowles et al. 2012; Ernst & Young 2011; van Passel 2008; Clift 1997; Interview #8)
	B4-2 Practical issues, such as funding, should be taken into account when discussing sustainable development solutions. (Interview #8)

Table 5.2 A list of statements regarding B. Sustainable development dimensions and solutions

The following sections (B1-B4) discuss the subcategories of sustainable development dimensions and solutions by summarizing participants' responses from the semi-structured interviews and key points in literature.

B1. Localizing solutions (B1-1 to B1-4)

Three statements capture two major elements in localizing solutions: incentives for localizing sustainable development actions and facilitating community efforts in sustainable development. The community incentives would be able to address social inclusion and empowerment on the ground level.

Several literatures address the benefits of localizing sustainable development solutions. Cuthill (2002) regards collaborative actions between local stakeholders the most effective means to achieve sustainability in communities. Swindall (2000) further proposes communication activities such as focus groups to involve the general public in technology related policies, options, and actions. However, Lehtonen (2004) questions the power imbalance between local stakeholders and global ones. For example, communicating sustainability from a global perspective would be very different than a region one, says Voinov (2007).

From the semi-structured interviews, participants argue that individuals are more willing to act sustainably when they receive opportunities, build a tight social network and gain access to resources. Being green would also serve an increased level of social status. For example,

community engagement is be an important role to achieve sustainable development. To ensure the transparency of information, Ireland needs to look into the lack of social equity.

Participants also regard empowerment a key element in public engagement around sustainable development in Ireland. People should be able to make changes in their own environments as they desire. By engaging people initially on an individual level, collective level would follow. Public engagement in sustainable development requires awareness from the public as well as support from local authority, research institutions, and community initiatives. For example, collaborations between NGOs and universities could bring forth ample opportunities such as incentives for student projects.

Regarding existing opportunities for sustainability in Ireland, participants argue that they are very limited. Participants talk about the access to information, for example via open data resources, where everyone has access to information regarding sustainability.

B2.Integrating solutions and dimensions (B2-1 to B2-8)

Seven statements address the importance of integrating solutions and dimensions in sustainable development. These statements include: multi-stakeholder discussions in sustainable development solutions; inter-connectivity of environmental, economical, and societal aspects; the combination of contrary approaches, for example top-down versus bottom-up, policy-driven versus market-driven approaches; individual versus collective levels of contributions in sustainable development.

Literature points out the challenges in adopting an integrated framework of sustainable development, such as the interaction between culture and technology, and also the optimization of various sustainable development approaches (Carley & Christie 1992). Norgaard (1988) also points out the imbalance between the science and social paradigm, which requires more inter-professional and multidisciplinary efforts (Logan 2001).

From the semi-structured interviews, participants express various perspectives regarding different approaches regarding sustainable development in Ireland. For example, participants discuss the opportunities regarding technological opportunities in sustainable development and discuss the obstacles in market diffusion and infrastructure. Some participants regard a mixed methods approach (top-down as well as bottom-up) the best solution. Top-down approaches would ensure regulations, for example the EU trading

scheme. Bottom-up approaches, on the other hand, would ensure individual access to resources and information.

The impact of systemic approach in sustainable development in Ireland is also mentioned. In order to have greater impacts, sustainable development requires policy at national or even international levels. Participants from the semi-structured interviews point out that In Ireland, sustainable development relies on policy submissions and public policy consultations.

B3.Developing evaluation indicators (B3-1 to B3-2)

Two statements illustrate participants' expectations in evaluating sustainable development in Ireland: developing more indicators to audit and measure the outcome of sustainable development; taking into account the agendas of various stakeholders.

The literature review points out that communication between political decision-makers and impact evaluators generates disjunctions and adjustments (Vicente & Partidário 2006). The difficulties in communication implies challenges in developing indicators to measure successful sustainable development (Kate et al. 2005). For example, Lehtonen (2004) warns that establishing an analysis of causal relationship among sustainable development indicators and sustainable development outcomes may be counterproductive since it might simultaneously exclude relevant factors.

From the semi-structured interviews, participants point out that developing evaluation indicators for sustainable development is challenging since environmental values are difficult to be quantified,. However, in the current society the focus on economic success leads to indicators like GDP to measure the outcome of sustainable development. The value of nature is somewhat invisible at the moment in Ireland. In Ireland, sometimes institutions are very much fixated on following certain measurement matrix, and as a result they fail to recognize other sustainability possibilities which might very well be within the organization's capacity and resources.

B4.Sustainable development with the business approach (B4-1 to B4-2)

Two statements describe sustainable development from a business approach. from the literature, Lingan (2012) argues that industries are keen to demonstrate their commitment in

sustainability, which shows in their operations and CSRs. Ahmed & Stein (2004) assert that science and technology are amongst the most effective means to enhance socio-economic development.

Participants in the semi-structured interviews also point out that green businesses and services bring forth economic opportunities. For example, a few participants from *The Green Way* argue that Cleantech would shift lives in Ireland, create job opportunities, enhance Ireland's economic competitiveness, and in turn improve the environment as well as the social economic dimension. They believe that if Ireland reorients the economy towards a clean paradigm, the environmental and social sustainability agendas will benefit.

5.1.3 Category C: Communication around sustainable development

Literature (see 2.4) and participants' discussions from the semi-structured interviews regarding communication around sustainable development (see 4.5) generate 17 statements. To further distinguish how perspectives in communication around sustainable development would be constructed in the Q methodology study, four subcategories are identified: stakeholders; barriers in communicating sustainable development; communication strategies; communication guidelines. Table 5.3 shows a list of statements from C. Communication around sustainable development and supporting literature/semi-structured interviews.

Subcategory	**Statement and supporting literature/semi-structured interviews**
C1 Stakeholders	C1-1 Collaboration of stakeholders would be effective in communication around sustainable development. (Frantzi et al. 2009; Macnaghten et al. 2005; Cuthill, 2002; Castells 2001; Donner 2001; Logan 2001; Interview #3, #6, #8)
	C1-2 Different stakeholders communicate quite

	differently regarding sustainable development due to their different agendas. (Kim 2007; Vicente & Partidário 2006; Scholderer & Frewer 2003)
	C1-3 There is more than one type of public that needs to be communicated regarding sustainable development. (Kim 2007)
	C1-4 Both the publics as well as local authorities play important roles in communication around sustainable development. (*Rio+20: Towards the Green Economy and Better Governance* 2011, p.13; Interview #7)
C2 Barriers in communicating Sustainable Development	C2-1 Communicating sustainable development requires careful articulation of messages and finding the right 'champion'. (Kate et al. 2005; van Dijck 2003; OECD 2002; Interview #2)
	C2-2 In communication around sustainable development, the initial step of engagement is the hardest. (Interview #4, #5)

	C2-3 Sustainability issues could be communicated too frequently and become misused or abused. (Swindall 2000; Berggren 1999; Interview #8)
	C2-4 More than just the mechanisms and approaches in sustainable development should be communicated. (Cooper 1997; Carley & Christie, 1992, p.163; Interview #3, #5)
C3 Communication strategies	C3-1 It is essential to find appropriate approaches in communicating sustainable development for the target audience (i.e. online, Face-to-Face, mass campaign, etc.). (Interview #4)
	C3-2 Multidisciplinary stakeholder communication is needed in communication around sustainable development. (Cots 2011; Cuppen 2010; Ahmed & Stein 2004; OECD 2002; Roberts 2000; Interview #8)
	C3-3 Effective communication around

	sustainable development needs 'language' that delivers impact. (Voinov 2007; Jackson 2005; Cash et al. 2003; Miller 2001; Interview #2)
	C3-4 Presenting the benefits of growth and economy is easier than accommodating complexities in sustainable development. (Barry 2007; Van Eijndhoven 1995)
	C3-5 The 'currency' for communication around sustainable development in Ireland is in economic terms. (Interview #2, #7)
C4 Communication guidelines	C4-1 There should be communication guidelines and protocols regarding communication around sustainable development issues. (Cots 2011; Carey 1989; Interview #7)
	C4-2 There should be communication indicators to evaluate the success of communication around sustainable development issues. (Rowe & Frewer 2005; Swindall 2000; Interview #6, #7)
	C4-3 Although different stakeholders have

	different agendas in sustainable development, it doesn't mean that the agendas are exclusive. (Weigold 2001; Frey et al. 1991)

Table 5.3 A list of statements regarding C. Communication around sustainable development

The following sections (C1-C4) discuss the subcategories of communication around sustainable development by summarizing participants' responses from the semi-structured interviews and key points in literature.

C1. Stakeholders (C1-1 to C1-4)

Four statements describe stakeholders in communication around sustainable development. Collaborations of stakeholders are crucial in communicating sustainable development. Collaborations refer to experts as well as non-experts. For collaborations among experts, literature points out that cross-disciplinary, multi-disciplinary collaborations are necessary (see 2.3.2). Non-experts collaborations include collective efforts in social movements driven by local stakeholders (Castells 2001; Kim 2007). For example, Meppem & Gill (1998) point out that engagement with community stakeholders could facilitate sustainable development learning and reflections in the form of dialogues.

From the semi-structured interviews, participants emphasize the importance of the public's voice. There are expertise and knowledge in the public sector. Once the public recognize the benefits in sustainable development, they will get involved. People are also happier to participate in sustainable activities collectively than individually. Thus, the communication process in sustainable development should be open to encourage creative collaboration ideas and innovations.

Participants point out that stakeholder collaboration in sustainability is quite different from public engagement. Stakeholder collaboration is related to creating partnership efficiently and effectively on a sustainable basis. Meaningful collaboration should ensure knowledge generation in cross-disciplinary fields. One of the benefits from collaboration is learning. From the semi-structured interviews, participants point out that learning is an important part of the stakeholder network.

Participants involved in *The Green Way* use stakeholder collaborations in *The Green Way* to demonstrate the interactions and dynamics among various stakeholders. For example, the initiative joins up dots and services across academic institutions, industries, social bodies, and economic development agencies. Everyone stakeholder looking at sustainable development with slightly differently perspectives but there is a common purpose, which is prioritizing the economic development aspect in sustainable development.

C2. Barriers in communicating Sustainable Development (C2-1 to C2-4)

Four statements describe the major barriers in communicating sustainable development: articulating proper communication languages; allocating champions; the danger of abusing the context of sustainability; over emphasizing technological aspects in sustainable development.

Literature point out several weaknesses in current communication models around sustainable development. For example, the public mostly gain knowledge regarding the environment via mass media rather than engaging in direct experiences (Lin 2013). Most communication messages in the media are linked with buzzwords, value statements, framing and persuasive strategies designed for specific target audiences. from the literature, Berggren (1999) and Swindall (2000) criticize on media catchwords around sustainability being too simple and misleading. This implies that the role of communication in mass media could result in misconceptions around sustainable development. In addition, the social part of sustainability is often overlooked (Cooper & van der Vorst 1997). Overlooking the social dimension in sustainable development often results in overemphasizing the technological aspects in sustainable development.

From the semi-structured interviews, participants point out that a lot of the issues in unsuccessful sustainable development projects result from miscommunication and inappropriate communication approaches. Furthermore, ineffective communication process hinders environmental policymaking.

The notion of persuasive communication is also captured in the participants' responses. Persuasive propositions in sustainable development are one of the the biggest long-term challenges in communication around sustainable development, since Ireland has to transition from sustainable development concepts to developing services. Participants also

regard allocating champions essential. Ireland needs people who are passionate and enthusiastic to demonstrate their commitment to the environment.

C3. Communication strategies (C3-1 to C3-3)

Three statements illustrate communication strategies in sustainable development: translating concepts and theories into practice; multidisciplinary communication; effective communication.

Literature point out that effective communication is a major challenge for the industry (Swindall 2000). Communication models are highly associated with social institutions (Carey 1989), thus making the translation of theories into practice essential for organizations. *Futerra Sustainability Communications* (2005) emphasizes on the role of communication, saying that it motivates sustainable development and makes sustainable development a reality. Voinov (2007) and Epstein & Roy (2001) further points out that people react to real sustainable activities, for example community gardening projects, rather than abstract ideals of sustainability.

From the semi-structured interviews, participants point out that the general public don't like new things and they are afraid of changes. Therefore it is difficult for them to incorporate sustainable actions in daily life. Regarding finding the sustainable development language which delivers effective results, they point out that the biggest challenge in Ireland is trying to find a common language for everyone and seek appropriate communication approaches for reaching consensus.

Regarding developing communication strategies to promote Ireland, there exists opportunities for Ireland to market itself green, especially in the food production area. Ireland could work towards branding the Irish products as 'green' and make them recognizable internationally. Participants further argue for communication process across disciplines. Different disciplines should be integrated and not be too fragmented. In a two-way communication process, both parties should make the efforts to make communication easy.

Some participants from the semi-structured interviews also suggest that communication messages framed in 'economic' terms could be effective, given the current economy crisis. One of the examples would be communication around *The Green Way*. For instance,

communication message regarding the benefits around *The Green Way* could provide companies with incentives to participate.

C4. Communication guidelines (C4-1 to C4-2)

Two statements address communication guidelines in sustainable development: developing indicators which include communication incentives; evaluating the success of communication around sustainable development.

Both literature and the semi-structured interviews capture the need for evaluating the communication process around sustainable development in Ireland. Participants point out that each sector has different sustainable development agenda and there should be communication guidelines and protocols to improve stakeholder communication and facilitate consensus building on sustainable development solutions. Participants also emphasize on the flexibility of stakeholder communication and point out that having different stakeholder agendas does not mean communication strategies are mutually exclusive.

5.2 Associations between categories A, B and C

This section identifies associations between the three categories: A. sustainable development definitions, B. sustainable development dimensions and solutions, and C. communication around sustainable development. The goal is to tease out more sophistications and complexities around the study subject and aid the final selection for the Q concourse. Theoretical codes are generated to conceptualize the relations between the categories.

5.2.1 Associations between sustainable development definitions (A) and sustainable development dimensions & solutions (B)

Discussions around sustainable development dimensions and solutions respond to the vagueness of sustainable development definitions (A1) needing more concrete approaches, such as localizing solutions and providing the public with access to sustainable development resources (B1). The integration of dimensions in sustainable development (B2), for example taking into consideration the tension between policy and market as well as top-down versus

bottom-up approaches (B2), also reflects the holism in sustainable development definitions (A1). The integration of the three pillars in sustainable development (B2) requires social capital and collective efforts (A2). Examples include creating incentives for local communities in sustainable development projects, and providing social inclusion and empowerment drivers as individual sustainable development incentives. Evaluation indications for sustainable development (B3) provide opportunities to understand the 'wicked' problems in sustainable development (A4). Participants' call for guidelines in sustainable development also indicates more structured frameworks for sustainable development policies and regulations (A3).

To sum up, multiple sustainable development dimensions formulate solid sustainable development definitions. However, sustainable development definition includes the notion of future, whereas sustainable development dimensions and solutions focus on current solutions. This seems to imply the disconnection between sustainable development theories and practice. Sustainable development definitions have the ability to tackle long-term issues and reflect on existing pitfalls. Practices in sustainable development are limited by technological, societal and time limitation. Compared to sustainable development in practice, sustainable development theories address more dimensions whereas sustainable development practices focus on specific, singular tasks. There are also tensions in sustainable development solutions, for example policy versus market approach, and top-down versus bottom-up ones.

For the Q concourse, we extract four theoretical codes from the associations between category A and B:

- holism of sustainable development
- interaction between sustainable development theories and practices
- systemic, expert-driven approach
- inclusive, bottom up approach

5.2.2 Identifying associations between (A) sustainable development definitions and (C) sustainable development communication

The communication barriers in sustainable development (C2) signal that there is no 'one-size-fits-all' panacea for sustainable development (A3). Communication around sustainable development in economic terms as a strategic approach (C3) is more effective in reaching out to target audiences, which again responds to the notion of needing more than 'one-size-fits-all' solutions in sustainable development (A3). Regarding misusing sustainable development values, for example greenwashing (A4), communication around sustainable development is identified as a major barrier (C2). Communication guidelines (C4) are potential solutions to the suggested add-ons to sustainable development definitions (A2) and the lack of concreteness in sustainable development definitions (A1). Stakeholders and public engagement in sustainable development (C1) respond to the need for collective efforts (A2).

Since sustainable development definitions address communication problems, especially regarding perception, value and behavioural challenges, it is important to address effective sustainable development communication strategies specifically designed for a range of audiences.

For the Q concourse, we extract four major codes from the associations between category A and C:

- Tailor-made sustainable development solutions
- Tailor-made sustainable development communication strategies
- Greenwashing
- Vagueness in sustainable development definitions

5.2.3 Identifying associations between (B) sustainable development dimensions & solutions and (C) sustainable development Communication

Identifying associations between (B) and (C) generates hypotheses of communication as a strategic solution to sustainable development problems. For example, localizing sustainable

development (B1) generate mobilization opportunities for public stakeholders (C1). However, there are barriers in initial engagement (C2).

In addressing the integration of sustainable development solutions and combining various sustainable development dimensions (B2), the collaborations of stakeholders with cross-disciplinary efforts (C1) as well as strategic communication approaches (C3), are essential. Communication guidelines and protocols (C4) could provide baselines for the evaluation indicators to measure the success of sustainable development (B3). The benefits delivered from the business and Cleantech approach (B4) demonstrate communication strategies around sustainable development in economic terms (C3).

For the Q concourse, we extract four theoretical codes from the associations between category A and C:

- strategic communication in sustainable development
- stakeholder collaboration in sustainable development
- sustainable development communication guidelines
- cleantech and economic-driven sustainable development agenda

The Q statements collected from the literature and nine semi-structured interviews generate 12 theoretical codes. These theoretical codes summarize the major concepts in sustainable development definitions, solutions, dimensions and communication around sustainable developments. These codes provide guidelines to the selection of Q statements for the final Q concourse.

5.3 The final Q concourse

In this study, we apply an inductive factorial design for the selection of the Q concourse. This means that we did not use a theoretical framework to provide guidelines for the selection of the Q statements prior to the collection of the Q statements. The preselected Q concourse is a collection of Q statements from the literature review and the nine semi-structured interviews. We then observed categories, subcategories, associations, and theoretical codes

emerged from these Q statements. Appendix F shows the preselected 86 Q statements in the Q concourse and their associating codes.

After the peer review session, four researchers in science communication reduced the 86 statements down to approximately 50-60 statements. In the final selection of the Q concourse, 55 statements are fine-tuned. Table 5.4 shows the final selection of the Q concourse- this is the set of Q statements that participants use for their Q sorting process.

Statements
1 There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)
2 Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches.
3 Stakeholders have polarized views on solutions and practices in sustainable development in Ireland.
4 In Ireland, the major discourse of sustainable development is currently being dominated by 'the managerial outlook'.
5 In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.
6 Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.
7 The complexity of sustainable development issues in Ireland makes communicating the concept of sustainable development difficult.
8 In the mainstream debate of sustainable development in Ireland, the societal definitions are often overlooked due to the dominance of the science paradigm.

9 Sustainable development can also be viewed as a scientific and technological endeavour. Science and technology are amongst the most effective means to enhance socio-economic development in Ireland.
10 Cleantech is an essential endeavor to achieve sustainability. The growth of Cleantech in Ireland will bring forth many opportunities, including energy, innovation, and 'green-collar' jobs.
11 A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver.
12 By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.
13 Scientific and technological debates often result in a polarized public: those who simply accept new technologies and trust the decisions made by 'experts', against those who are suspicious of innovations.
14 In Ireland, people don't like new things and they are afraid of changes. It is very hard to mobilize the public to act sustainably due to their 'defence mechanism', unless they receive 'benefits' in some forms.
15 In Ireland, to mobilize people into sustainable activities, motivational tools such as creating incentives, showing them how easy it could be done, or community initiatives could be useful.
16 It is easy to see the short-term effects on behavioral change regarding sustainability, but more difficult to monitor and evaluate effects on a longer term.
17 The NGOs sector in Ireland has a huge amount of expertise and knowledge to offer for sustainable development.
18 Sustainable development is about value judgment, about how humans interact with the nature to address human needs.

19 Ireland is wealthy in terms of resources, but as a developed country, the general public is immune to environmental impacts.
20 There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably.
21 The sustainable development agenda in Ireland should represent all levels, including social partnership, local authorities and procurements.
22 The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.
23 The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.
24 Although individual contributions are fruitful in creating a sustainable environment; it is policy at the national or international level that's going to create real impacts.
25 In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.
26 In Ireland, social transparency or social equity are not present in sustainable development.
27 The term 'sustainability' or 'sustainable development' used by environmentalists, governments, politicians, industries and the business show very diverse visions.
28 In Ireland, the challenge for carrying out sustainable development is that there is not enough time to sit down and discuss what the most important values should be for the society.
29 It is very difficult to find the language that delivers effective impact in sustainable development endeavors, especially with economy being the 'currency' for policy.

30 In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.
31 Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders to foster communication.
32 Not everyone in Ireland wants sustainability since people have different priorities.
33 In Ireland, there's a movement towards resilience and collective transitions in sustainable actions.
34 Framing sustainable development with economic arguments is much easier than accommodating complexities in science and technology.
35 People react to sustainable issues most relevant to them, for example green community/campus activities. They do not respond to the more abstract notion of sustainability.
36 Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.
37 The Irish government is not communicating clearly and coherently to the people the priorities of sustainable development issues.
38 Sustainable development models in Ireland should not remain merely top-down and expert-driven. Rather, a more inclusive and transparent process should be adopted.
39 Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainable policies and operations.
40 In Ireland, media catchwords on sustainability-related topics are too simple and misleading, and do not provide meaningful insights for sustainable development.
41 Ireland should shift the leadership focus from policy makers to market shapers, making sustainable marketing an open process.

42 The Irish government often regards science and technology merely as an instrumental tool for drawing up sustainable development policies.
43 Sustainable development initiatives in Ireland are more effective when they are regulation-driven.
44 The environmental and economic pillars in sustainable development are very disconnected at this moment in Ireland - the overlapping parts are missing, even more missing than it has been in the past.
45 One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders.
46 In communication around sustainable development, it is essential to identify the 'champions', the ones who are enthusiastic in creating strategic opportunities and changes for Ireland.
47 Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.
48 Sustainable development should not be GDP development.
49 The challenge in the societal part of sustainable development is that we have to move a gigantic market from fossil fuel to alternatives. It is difficult to make people understand in a very short period of time that solutions are feasible.
50 In Ireland, it is difficult for the industry to collaborate with the academic in large-scale sustainable development projects; rather, collaborations are mostly niches with specific goals.
51 Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

52 The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.
53 There should be more education for the general public in Ireland regarding sustainable development.
54 It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.
55 New protocols of communicating science need to be drawn up to address controversial scientific issues in cross-disciplinary fields.

Table 5.4 The final section of 55 Q statements

The next chapter, Chapter 6, presents in detail the factor analysis results of 28 Q sorts from the Q sorting processes conducted by 28 participants in our Q methodology study.

Chapter 6 Q Methodology Study: Factor Analysis Results and Discussions

This chapter outlines the factor analysis results from the Q methodology study based on 28 participants (see Chapter 3, 3.3.2, Table 3.2 for the list of participants for the main Q methodology study) ranking the 55 Q statements presented in Chapter 5 (see 5.4, Table 5.3). We conduct four-, five-, and six-factor solutions to explore the most suitable factor solution that best explain the perspectives regarding the challenges and solutions of communication around sustainable development in Ireland. The selection of a suitable factor solution depends on maximizing the study variance and minimizing the 'confounders', referring to participants whose perspectives around the subject of study are associated with multiple factors (Cairns 2012). After the completion of factor analysis and initial interpretations of four-, five- and six-factor solutions, we select the six-factor solution as the most suitable factor solution for the interpretations of our Q methodology study (see Appendix K for the full factor analysis results). Besides fulfilling statistical criteria for a factor solution, the six-factor solution also provides the best qualitative interpretations for our study.

Section 6.1 presents the outcome of the factor analysis with quantitative results in four-, five-, and six-factor solutions. The section includes correlations between Q sorts, centroid factor analysis, varimax rotation method, eigenvalues, study variance, factor correlations, factor loadings and factor scores (to be defined in 6.1.1-6.1.6). Section 6.2 demonstrates the qualitative approaches for analyzing the factor analysis results: identifying Q statements which receive the highest positive and negative factor scores and making use of crib-sheets (Watts & Stenner 2012). The next chapter, Chapter 7, further elaborates on the full factor interpretations for the six-factor solution, supported by participants' rationales during the post-sorting interviews.

6.1 Factor Analysis with PQMethod

This section outlines the factor analysis results with four-, five-, and six-factor analysis. Factor analysis is a statistical method for observing latent factors. In the Q methodology study, we use PQMethod 2.33, a free software package specially designed by Schmolck (2002) to run

the factor analysis on the Q methodology study results. In the PQMethod software package, researchers can choose the numbers of factors to be extracted, the rotation methods, and other statistical information. PQMethod can also export data such as correlations between Q sorts, un-rotated factor matrix, factor scores, correlations between factor scores, and factor arrays. The raw data from the six-factor solution analysis results using PQMethod 2.33 is attached in Appendix K. The names of the participants are taken out to protect participants' confidentiality.

6.1.1 Correlations between Q sorts

The first step of the analysis in the Q methodology study is to calculate correlations between the Q sorts. The correlations represent the degree of associations between different Q sorts, or in other words, the (dis)similarity of the participants sharing a perspective in this study (van Exel & de Graaf 2005). The correlations between Q sorts is included in Appendix K.

6.1.2 Centroid factor analysis

Q methodologists commonly use centroid analysis to identify factors, although some use Principal Component Analysis (PCA) (Schmolck 2002). In this study, we use centroid analysis to extract the factors (please see 3.3.5 for the justification of choosing the centroid factor analysis over principal component analysis). There are two major methods for extracting the centroids using the centroid factor analysis: the customary method described in Brown (1980), and Horst's (1965) method[1] with iterative solutions for communalities. Brown's (1980) centroid extraction uses the 'magic number 7' by default, although PQMethod software allows a maximum of eight factors. Horst's centroid method estimates diagonal entries in the correlation matrix and reduces the irregularities often observed with the customary method (Schmolck 2002).

However, to demonstrate the benefits of choosing Centroid Factor Analysis over Principal Component Analysis, we also ran a factor extraction with Principal Component Analysis. Table 6.1 shows the factors extracted with PCA generating eigenvalues greater than 1 - factors which could be taken into consideration for rotation method and final interpretation.

[1] See (section 3): http://schmolck.userweb.mwn.de/qmethod/pqmanual.htm#qcent

Factor	Eigenvalues	As Percentages	Cumulated Percentages
1	8.9131	31.8325	31.8325
2	2.2374	7.9907	39.8232
3	1.9236	6.8700	46.6932
4	1.7122	6.1151	52.8083
5	1.4659	5.2352	58.0435
6	1.4561	5.2003	63.2439
7	1.1859	4.2355	67.4793
8	1.0359	3.6996	71.1789

Table 6.1 Factors extracted with eigenvalues greater than 1 with PCA

From the PCA results, it showed that 8 factors are extracted from the statistical analysis. However, the results do not suggest that we need to rotate all 8 factors - the sizes of the Eigenvalues indicate some importance when deciding on how many factors to keep for rotation (Schmolck 2002). Since there are only 28 participants in our study, having 8 factors would be too many and resulting in overlapping factors. In addition, with CFA in the PQMethod software, the maximum number of factors in factor extraction is 8 (with Horst (1965)) and 7 (with Brown (1980)). It is clear that running our data with PCA in this case does not suggest a different (lower number of) factor extraction. In addition, by looking at the cumulated percentages of the eigenvalues, to achieve representation in our study by more than 50%, we will have to take into consideration at least 4 factors for the rotation method. By using PCA to extract factors, we have reached similar numbers of factor extraction with using a CFA (see 6.1.4 for extracting four-, five-, and six-factor solutions with CFA).

Therefore, using CFA and PCA in our analysis will not determine and influence the number of factors extracted from the data. We argue that factor extraction should be based on achieving the most optimal combination of quantitative evidences with qualitative interpretations of the data, which is demonstrated in section 6.2.

6.1.3 Varimax rotation

A Q methodology study can use either objective or subjective rotation methods. Rotations do not affect the the relationships between the Q sorts, but only shift the perspectives of how they are observed (van Exel & de Graaf 2005). Objective rotation methods include statistical rotation methods such as varimax, which allow correlations between reference axes. Reference axes refer to the x-axes which runs horizontally and the y-axes which runs vertically. The reference axes make a coordinate plane. In non-rotated methods, the reference axes are spatially perpendicular (Kline 1994). In varimax rotation, the positions of the reference axes are arranged in such ways to produce the maximum study variance (Watts & Stenner 2012). In other words, the varimax factor rotation provides orthogonal solutions, ensuring that the factors are always at right angles to each other. This allows the study variances to be distributed in ways that each Q sort would have the highest association with only one factor (Stricklin & Almeida 1999). On the other hand, if the study aims to test certain hypotheses or is driven by theoretical assumptions, the researcher could perform a judgmental rotation method, in which the researcher determines how the reference axes correlate with each other.

In this study, we do not have a theoretical framework to inform the factor analysis results. Instead, we observe perspectives emerged from the data set. Therefore, we apply an objective statistical rotation method using varimax. The varimax rotation provides the researcher to observe data from the perspective where the final factors extracted are highly representative of the participants' perspectives. Participants who share the same factors are highly correlated (Van Exel & de Graaf 2005).

6.1.4 Eigenvalues and study variance

In factor analysis, the researcher looks at eigenvalues to determine the numbers of factors to be extracted from the data. An eigenvalue is a valid indication of how much information a

factor captures (Kline 1994). Eigenvalues less than 1.00 are often cut-off points for factor extraction. This is called the Kaiser-Guttman criterion (Guttman 1954; Kaiser 1960).

Factor analysis aims to achieve the highest study variance from the original correlation matrix (Watts & Stenner 2012). A study variance between 35%-40% or above would normally be adequate for a sound factor solution (Watts & Stenner 2012, p.105; Kline, 1994). Kline (1994) divides study variance into three types: common variance, specific variance, and error variance. Common variance refers to the variability in a Q sort shared by the group; specific variance refers to individual participant's Q sort variance to specific Q sorts; error variance is produced by system's random error. The study variance in a Q study refers to the combination of all three types of variances.

In this study, the four-factor solution explains 44% of the study variance; the five-factor solution explains 48% of the study variance; the six-factor solution explains 53% of the study variance. The following tables show the number of participants loading onto each factor and the variance of each factor, as well as which Q sort loads onto each factor. A four-factor solution explains 44% of the total variance (see Table 6.1), with 25 participants loading significantly onto one of the factors and 3 confounding Q sorts, who loads significantly on more than one of the factors (see Table 6.2). In this study, confounded participants refer to those whose Q sort loads significantly on more than one factor; non-significant refers to those who did not load onto any factor.

Factor	**1**	**2**	**3**	**4**
Number of participants loading onto the factor	7	6	2	10
Percentage (%) of total variance in the factor	13	12	5	15

Table 6.1 Number of participants and the percentage of total variance in the four-factor solution

Factor number	**Q sort numbers**
1	1, 6, 10, 11, 16, 20, 24

2	2, 4, 7, 14, 23, 26
3	3(-ve), 25
4	1, 8, 9, 12, 13, 17, 18, 19, 21, 22
Confounded	5, 15, 28
Non-significant	None

Table 6.2 Factors defining Q sorts for the four-factor solution ((-ve) indicates a negative loading onto the factor)

A five-factor solution explains 48% of the total variance (see Table 6.3), with 23 participants loading significantly onto one of the factors and 3 confounding Q sorts, who loads significantly on more than one of the factors. Two participants are not significantly loaded onto any of the factors (see Table 6.4).

Factor	**1**	**2**	**3**	**4**	**5**
Number of participants loading onto the factor	7	6	4	1	5
Percentage of total variance in the factor	11	11	11	4	11

Table 6.3 Number of participants and the percentage of total variance in the five-factor solution

Factor number	**Q sort numbers**
1	6, 10, 11, 12, 16, 24, 27
2	2, 4, 7, 14, 23, 28
3	8, 13, 17, 19
4	3
5	9, 15, 18, 20, 21

Confounded	1, 22, 25
Non-significant	5, 26

Table 6.4 Factors defining Q sorts for the five-factor solution

A six-factor solution explains 53% of the total variance (see Table 6.5), with 20 participants loading significantly onto one of the factors and 6 confounding Q sorts, who load significantly on more than one of the factors. Two participants are not significantly loaded onto any of the factors (see Table 6.6).

Factor	**1**	**2**	**3**	**4**	**5**	**6**
Number of participants loading onto the factor	3	3	4	5	4	1
Percentage of total variance in the factor	8	10	10	10	10	5

Table 6.5 Number of participants and the percentage of total variance in the six-factor solution

Factor number	**Q sort numbers**
1	5, 6, 10
2	4, 7, 14
3	9, 13, 15, 18
4	11, 12, 16, 20, 24
5	1, 8, 17, 27
6	3
Confounded	2, 21, 22, 23, 25, 28
Non-significant	19, 26

Table 6.6 Factors defining Q sorts for the Six-factor solution

6.1.5 Correlations between the factors

The correlations between the factors indicate the associations between different perspectives. Table 6.7 presents the correlations between the factors for a four-factor analysis. Table 6.8 presents the correlations between the factors for a five-factor analysis. Table 6.9 presents the correlations between the factors for a six-factor analysis. The correlations are rounded up to the third decimal point.

	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**
Factor 1	1.000	0.421*	0.091	0.497*
Factor 2	0.421*	1.000	0.353	0.566*
Factor 3	0.091	0.353	1.000	0.321
Factor 4	0.497*	0.566*	0.321	1.000

Table 6.7 Correlations between the factors for a four factor analysis (*correlation significant)

	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
Factor 1	1.000	0.449*	0.438*	-0.092	0.496*
Factor 2	0.449*	1.000	0.473*	-0.075	0.467*
Factor 3	0.438*	0.473*	1.000	0.004	0.596*
Factor 4	-0.092	-0.075	0.004	1.000	-0.055
Factor 5	0.496*	0.467*	0.596*	-0.055	1.000

Table 6.8 Correlations between the factors for a five factor analysis (*correlation significant)

	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**

Factor 1	1.000	0.288	0.386*	0.480*	0.504*	0.003
Factor 2	0.288	1.000	0.374	0.290	0.515*	-0.069
Factor 3	0.386*	0.374	1.000	0.352	0.606*	0.078
Factor 4	0.481*	0.290	0.352	1.000	0.470*	-0.055
Factor 5	0.504*	0.515*	0.606*	0.470*	1.000	0.007
Factor 6	0.003	-0.069	0.078	-0.055	0.007	1.000

Table 6.9 Correlations between the factors for a six factor analysis (*correlation significant)

Table 6.7, 6.8, and 6.9 show that correlations between the factors are quite significant for four-factor, five-factor, and six-factor solutions. This implies that there might be similarities among those factors. In other words, participants' perspectives might overlap, which could make it difficult to interpret the distinctiveness of different factors (further discussions regarding implications in 6.3 & 7.4).

6.1.6 Factor loadings and factor scores

Cuppen et al. (2010) refer factor loadings as a measurement of agreement for each of the Q sort on a factor during the Q analysis. In this study, factor loadings higher than 0.35 are considered statistically significant at the 0.01 level. This is calculated as: 2.58*standard error (SE); SE= $1 \div \sqrt{}$(number of statements)(McKeown & Thomas 1988). In this study, the factor loading is: $2.58 \times 1 \div \sqrt{55}=0.347$.

A factor score in the Q methodology study is a numerical measurement of a statement's association with each of the factors. In this study, factor scores range from -5 to +5 (see 3.3.3). Factor scores present the idealized sort patterns for each of the factors (Cairns 2012). Table K.1, K.2, and K.3 in Appendix K show factor scores for four, five and six-factor solutions. The qualitative interpretations of these factor solutions are further elaborated in 6.2.2.

6.2 Factor Interpretations

Watts and Stenner (2005) state that there is no one 'objective correct answer' to the final solutions of the analysis, since the process is abductive. To achieve Stephenson's pursuit of

holism on the interpretation of factor analysis results, the researcher should pay attention to the whole configuration of the factor arrays rather than focusing only on Q statements with the highest or lowest rankings in a configuration (ibid). A factor array refers to a diagram representing the overall perspectives for a factor after factor scores have been calculated. A factor array reveals the patterns of response from participants associated with that particular factor (Brown 2003). In this study, we use crib sheets (Watts & Stenner 2012) to assist us in the interpretations of the factor analysis results. With the use of crib sheets, the researcher gets a fuller picture of each factor solution.

In the following section, we first present statements receiving the highest positive and negative scores with four, five and six-factor solution. We will then demonstrate how to use crib sheets to interpret the factor analysis results for four, five and six-factor solution.

6.2.1 Statements receiving the highest positive and highest negative scores

Table 6.10, 6.11, and 6.12 present statements receiving the highest positive scores for four-, five- and six-factor solutions. These statements could be interpreted as demonstrating the strongest impacts on defining a certain factor solution.

Factor	Statement receiving the highest positive scores (+5)
Factor 1	20(+5) There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably. 23(+5) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.
Factor 2	45(+5) One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders. 53(+5) There should be more education for the general public in Ireland regarding sustainable development.

Factor 3	38(+5) Sustainable development models in Ireland should not remain merely top-down and expert-driven. Rather, a more inclusive and transparent process should be adopted. 52(+5) The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.
Factor 4	23(+5) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority. 30(+5) In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.

Table 6.10 Statements receiving the highest positive scores for four-factor solutions

Factor	**Statement receiving the highest positive scores (+5)**
Factor 1	23(+5) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority. 47(+5) Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.
Factor 2	45(+5) One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders. 53(+5) There should be more education for the general public in Ireland regarding sustainable development.
Factor 3	30(+5) In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.

	44(+5) The environmental and economic pillars in sustainable development are very disconnected at this moment in Ireland - the overlapping parts are missing, even more missing than it has been in the past.
Factor 4	10(+5) Cleantech is an essential endeavor to achieve sustainability. The growth of Cleantech in Ireland will bring forth many opportunities, including energy, innovation, and 'green-collar' jobs. 43(+5) Sustainable development initiatives in Ireland are more effective when they are regulation-driven.
Factor 5	20(+5) There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably. 23(+5) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.

Table 6.11 Statements receiving the highest positive scores for five-factor solutions

Factor	**Statement receiving the highest positive scores (+5)**
Factor 1	11(+5) A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver. 47(+5) Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.
Factor 2	21(+5) The sustainable development agenda in Ireland should represent all levels, including social partnership, local authorities and procurements. 45(+5) One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders.
Factor 3	23(+5) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.

	30(+5) In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.
Factor 4	20(+5) There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably. 23(+5) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.
Factor 5	31(+5) Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders to foster communication. 38(+5) Sustainable development models in Ireland should not remain merely top-down and expert-driven. Rather, a more inclusive and transparent process should be adopted.
Factor 6	10(+5) Cleantech is an essential endeavor to achieve sustainability. The growth of Cleantech in Ireland will bring forth many opportunities, including energy, innovation, and 'green-collar' jobs. 43(+5) Sustainable development initiatives in Ireland are more effective when they are regulation-driven.

Table 6.12 Statements receiving the highest positive scores for six-factor solutions

Table 6.13, 6.14, and 6.15 present statements receiving the highest negative scores for four-, five- and six-factor solutions. These statements could also be interpreted as demonstrating the strongest impacts on defining a certain factor solution, however in the opposite direction.

Factor	**Statement receiving the highest negative scores (-5)**
Factor 1	51(-5) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

	54(-5) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.
Factor 2	19(-5) Ireland is wealthy in terms of resources, but as a developed country, the general public is immune to environmental impacts. 54(-5) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.
Factor 3	43(-5) Sustainable development initiatives in Ireland are more effective when they are regulation-driven. 51(-5) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.
Factor 4	06(-5) Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life. 36(-5) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

Table 6.13 Statements receiving the highest negative scores for four-factor solutions

Factor	**Statement receiving the highest negative scores (-5)**
Factor 1	51(-5) Everything else would fall through successfully once the economic dimension in sustainable development is achieved. 54(-5) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.
Factor 2	36(-5) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

	54(-5) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.
Factor 3	28(-5) In Ireland, the challenge for carrying out sustainable development is that there is not enough time to sit down and discuss what the most important values should be for the society. 36(-5) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.
Factor 4	02(-5) Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches. 52(-5) The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.
Factor 5	06(-5) Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life. 36(-5) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

Table 6.14 Statements receiving the highest negative scores for five-factor solutions

Factor	**Statement receiving the highest negative scores (-5)**
Factor 1	51(-5) Everything else would fall through successfully once the economic dimension in sustainable development is achieved. 54(-5) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.
Factor 2	28(-5) In Ireland, the challenge for carrying out sustainable development is that there is not enough time to sit down and discuss what the most important values should be for the society.

	36(-5) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.
Factor 3	06(-5) Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life. 54(-5) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.
Factor 4	36(-5) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice. 51(-5) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.
Factor 5	36(-5) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice. 51(-5) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.
Factor 6	02(-5) Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches. 52(-5) The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.

Table 6.15 Statements receiving the highest negative scores for six-factor solutions

6.2.2 Summaries for four-, five- and six-factor solutions

This section summarizes the results from four-, fix- and six- factor analysis. A crib sheet is created for each of the factor analysis to assist the researcher with a systematic and consistent approach to interpret factors (Watts & Stenner 2012). The idea of the crib sheet is to seek a holistic interpretation of every single item, namely each one of the Q statements in

the factor array. In this study, the crib sheets outline six categories of Q statements for each of the factor arrays:

- Q statements with the highest ranking in this factor array
- Q statements with the second highest ranking in this factor array
- Q statements ranking higher in this factor array than in other factor array
- Q statements ranking lower in this factor array than in other factor array
- Q statements with the second lowest ranking in this factor array
- Q statements with the lowest ranking in this factor array

Please see Appendix H, I, J for the complete crib sheets for four-, five- and six-factor solution.

Table 6.16 summarizes the four-, five- and six-factor solution interpretations (perspective types) and factor analysis results:

Perspective Types (4, 5, 6-factor solutions)	**Factor analysis results**
Type 1: Pessimistic outlook; Ireland needs systemic, regulatory changes **Type 2:** Optimistic outlook, multiple solutions to tackle sustainable development challenges **Type 3:** Bi-polar perspectives; consensus on problems but discords on solutions **Type 4:** Pessimistic outlook, individual indifference among the public is the major problems	Eigenvalue: 8.25; Study variance: 13%; 6 participants Eigenvalue: 1.37; Study variance: 13%; 6 participants Eigenvalue: 1.25; Study variance: 5%; 2 participants Eigenvalue: 1.37; Study variance: 15%; 10 participants
Type 1: Pessimistic outlook; systemic, regulatory and policy-driven approaches **Type 2:** Optimistic outlook, inclusive communication model **Type 3:** Inclusive communication approaches, excluding the economic approach	Eigenvalue: 8.43; Study variance: 11%; 7 participants Eigenvalue: 1.49; Study variance: 11%; 6 participants Eigenvalue: 1.54; Study variance: 11%; 4 participants

Type 4: Firm believer in the economic dimension driving the sustainable development outlook, with regulatory, expert-driven approaches	Eigenvalue: 1.11; Study variance: 4%; 1 participants
Type 5: Pessimistic, against the economic, science and technology agenda: apply ground-level approaches	Eigenvalue: 1.21; Study variance: 11%; 5 participants
Type 1: Pessimistic about Ireland adopting a growth model in sustainable development; sustainable development model in Ireland should be systemic, expert-driven, government-led	Eigenvalue: 8.46; Study variance: 8%; 3 participants
Type 2: Optimistic, inclusive stakeholder communication	Eigenvalue: 1.54; Study variance: 10%; 3 participants
Type 3: Pessimistic regarding the Irish public's attitudes towards sustainable development	Eigenvalue: 1.57; Study variance: 10%; 4 participants
Type 4: No consensus on solutions for multiple challenges; fatalistic	Eigenvalue: 1.18; Study variance: 10%; 5 participants
Type 5: Strategic communication to enhance integrative approaches in sustainable development	Eigenvalue: 1.14; Study variance: 10%; 4 participants
Type 6: Cleantech and economic dimension should drive the sustainable development outlook	Eigenvalue: 1.06; Study variance: 5%; 1 participants

Table 6.16 A summary of four-, five- and six-factor solutions

Before we present the interpretations for four-, five-, and six-factor solution, we would like to emphasize that the analysis from the Q methodology study aims to explore and identify discourses shared among the 28 participants in our study, instead of focusing on correlational connections or causal relationship between characteristic of participants' viewpoints as in the case of using survey methods (R methodology). Therefore, the following subsections present the perspectives on sustainable development in Ireland, extracted from both factor analysis and the nuances teased out from the post-sorting interviews. It is not appropriate to link any stakeholder type to particular perspectives, or draw conclusions on which perspectives should be favoured and emphasized from the quantitative results presented in the previous sections.

6.2.2.1 Four-factor solution

This section outlines a summary for interpretations with four-factor solution. Interpretations are carried out by referring to the crib sheet as well as participants' responses during the post-sorting interviews. Descriptive titles are attached to each of the factors for the purpose of comparing and contrasting distinctive perspectives among different factors. In the following paragraphs, the statistical data regarding each particular factor in the four-factor solution is summarized, followed by an overview of the main concepts extracted from that particular factor.

Factor 1: Pessimistic outlook; Ireland needs systemic, regulatory changes

Factor 1 has an eigenvalue of 8.25 and explains 13% of the study variance. Six participants (5 males and 1 female) are significantly associated with this factor. The female participant is from a sustainable development consultancy agency. Two male participants are residents of the Ecovillage in Cloughjordan. One male participant is from the local authority. One is an engineer at a research institution, and another one is involved in the public sector support of environment and sustainability.

Participants sharing this perspective have a general pessimistic outlook regarding sustainable development in Ireland. The Irish efforts in sustainable development policies are reactive on the global scale and the society is not adopting a sustainable lifestyle. There exists a huge gap between environmental awareness and real actions. Business-as-usual model has become the norm. Discord on what should be included in sustainable development is becoming an issue in Ireland, where stakeholders from various disciplines propose different solutions and people having different priorities. These priorities, unfortunately, are not related to sustainability. The industry/business sector determines the sustainable development outlook, and the government and media are not communicating the priorities in sustainable development clearly. However, participants in this study do not consider communication challenges the core problem for Ireland's sustainable development. They also do not regard stakeholder communication and collaboration being effective solutions for sustainable development issues.

As a consequence, participants argue for a systemic change and a shift towards a low-carbon footprint society for all parties involved. They think by developing solid sustainable

development policies and regulations, Ireland would benefit. They are against inclusive and open policy models which consist of experts as well as non-experts. They also don't think using economic success to drive the environmental and societal dimensions would be effective. Participants do not think bottom-up incentives could deliver large impacts and drive long-term behavioural changes. They also do not think that Ireland at this moment has the capacity to provide 'champions' to drive sustainable development. However, participants think that Ireland is capable of integrating the three dimensions in sustainable development, for example using theories to inform practices to identify overlapping parts in the environmental and economic dimensions.

Besides the call for a systemic framework, participants also propose using science and innovation to drive sustainable development forward, especially for socio-economic development, for example like Cleantech to drive enthusiasms from Irish industries/corporations. However, participants also point out potential risks in public discords from science and technology debates, where science dominates societal discussions in sustainable development, the government misuses science and technology, or greenwashing issues.

Factor 2: Optimistic outlook, multiple solutions to tackle sustainable development challenges

Factor 2 has an eigenvalue of 1.37 and explains 13% of the study variance. Six participants (4 males and 2 females) are significantly associated with this factor. One of the female participant is from a local sustainable development community initiative, the other one is an engineer from a research institution. One male participant is a resident of the Ecovillage in Cloughjordan. One is from a sustainable development consultant agency. The rest of the two male participants are involved in the public sector support of environment and sustainability.

Participants sharing this perspective are in general optimistic about the current status of sustainable development in Ireland. Environmental awareness and sustainable living is prominent across the general public. There are good examples of transition movements in Ireland, for example the Ecovillage in Cloughjordan. Participants also argue that the general public cares about environmental impacts and they are willing to change their behaviours regardless of economic benefits. Public consultation in environmental issues does not require tremendous efforts. Collaboration between the industry and academia in large-scale

sustainable development projects is successful, and the industry/corporations are incorporating sustainability in their operations.

Participants sharing this perspective regard integrative approaches in sustainable development effective for Ireland, including: inclusive communication approach, systemic approach, market-driven approach, science and innovations, and economic framing. They consider these integrative approach ideal for Ireland. Regarding the inclusive communication approach, they think that the sustainable development policy agenda should include all stakeholders, and provide more sustainable development education for the general public. The communication language in sustainable development should also be concrete and simple, and target all stakeholders.

Participants disagree with science and technology being a threat in dominating societal debates. They believe that the Irish organizations/corporations are authentic in their sustainable operations. However, they do not regard science and technology as the most effective means in enhancing socio-economic development in Ireland.

Regarding the communication challenge, participants believe that there is a big challenge in communicating to a variety of stakeholders, since everyone understands sustainable development differently. Unlike participants sharing the perspective of the previous factor, participants sharing this perspective regard stakeholder collaborations and dialogues as effective means to achieve sustainable development objectives and address human values. They also regard having 'champions' an effective mean to drive sustainable development.

Participants think that the economic dimension could serve as an opportunity to drive sustainable development by delivering effective communication languages regarding economic benefits. They believe that in Ireland the economy could be sustainable. However, they don't think that GDP should be used as an indicator to measure the success of sustainable development.

Factor 3: Bi-polar perspectives; consensus on problems but discords on solutions

Factor 3 is a bipolar factor, which has an eigenvalue of 1.25 and explains 5% of the study variance. Two participants (2 males) are significantly associated with this factor. One of them is involved in *The Green Way*. He is significantly associated with this factor negatively. The

other one is from a local sustainable development community initiative who is associated with this factor positively.

Both participants regard the communication of sustainable development important, especially the collaboration of stakeholders and mutual objectives in sustainable development. They argue that concrete and persuasive communication messages should be designed for different stakeholders due to the complexity of sustainable development issues. They also argue for new ways of communicating controversial sciences. However, they have bipolar approaches in the sustainable development communication model. One argue for a bottom-up and inclusive approach which involves non-experts as well as experts to achieve collective impacts while the other thinks that a top-down, systemic approach with regulatory frameworks and policies would be more effective in achieving sustainable development objectives.

Regarding the outlook of sustainable development in Ireland, both participants agree that Ireland is more passive in sustainable development policies on the global scale. One participant has a more optimistic outlook regarding the public's participation in sustainability, while the other one remains doubtful, and argues that there is a lack of social transparency in Ireland. However, they don't regard the lack of public's engagement in sustainability strongly associated with the attitude-action gap, or an indication of indifference towards the environment. As a consequence they don't regard public education in sustainable development a priority in Ireland. They also don't think individual incentives such as community initiatives are effective ways to achieve sustainability. Collaboration between the academic and industry in large-scale sustainable development projects in Ireland do not face big barriers. Public consultation is not a big challenge for Ireland. The Irish government is communicating adequately to the public regarding sustainable development issues. They do, however, feel that the media is misleading in communicating sustainable development to the public.

One participant thinks that the three pillars in Ireland are not balanced, which indicates that the integrative approach in sustainable development might be only ideal in theory but difficult to be carried out in practice, for example, the transition of the society from fossil fuels to alternative energies. Another participant, however, takes on a different approach, and argues that the economic dimension should drive the environmental and societal

dimensions. He points out that with support of Cleantech innovations and motivated Irish industries/corporations in the engagement of sustainable development, economic growth would be achieved via an open-market approach .

Factor 4: Pessimistic outlook, individual indifference among the public is the major problem

Factor 4 has an eigenvalue of 1.37 and explains 15% of the study variance. Ten participants (3 males and 7 females) are significantly associated with this factor. Two of the female participants are from a local sustainable development community initiative. Two others are scientists/engineers from research institutions. Another one is involved in the public sector support of environment and sustainability. One is from NGOs. One is a resident of the Ecovillage in Cloughjordan. One male participant is an engineer from a research institution. One is from sustainable development consultant agency. Another one is in the public sector support of environment and sustainability.

Participants sharing this perspective argue that sustainable development is not just about addressing human values. Sustainable development problems in Ireland are not holistic, and people often put a time limitation to carrying out initiatives. Sustainable development policies are in general transparent. In fact, Irish industries/organizations are demonstrating authentic sustainable development operations and greenwashing is not a prominent problem. However, despite the fact that sustainable development theories and practices are well connected, the environmental and economic dimensions are disconnected. This is probably due to the government using science and technology merely as instrumental tools to drive sustainable development.

Participants are more concerned about the individuals' indifference towards sustainability, and those individuals who are aware of sustainability but lack of motivation to behave sustainably. Communication towards the public regarding sustainable development is difficult, and there are very few transition movements in Ireland. The only one good example is the Cloughjordan Ecovillage. Several solutions are proposed, including community-driven incentives and champions. However, participants sharing this perspective do not regard stakeholder communication an effective solution to motivate individual behaviours, despite the fact that they recognize the complexities in communicating sustainable development. Although participants think that it is challenging to translate sustainable development concepts for a variety of stakeholders, they do believe that sustainability should be a

common goal for everyone. At the same time, they feel that the government is also responsible for not communicating well to the public regarding sustainable development issues.

Regarding the economic dimension in sustainable development, participants do not believe that having a successful economy demonstrates a sustainable society, or that only adopting a business-as-usual model is ideal for Ireland. However, they do think that GDP could be an indicator for measuring sustainable development.

6.2.2.2 Five-factor solution

This section outlines a summary for interpretations with five-factor solution. Interpretations are carried out by referring to the crib sheet as well as participants' responses during the post-sorting interviews. Descriptive titles are attached to each of the factors for the purpose of comparing and contrasting distinctive perspectives among different factors. In the following paragraphs, the statistical data regarding each particular factor in the five-factor solution is summarized, followed by an overview of the main concepts extracted from that particular factor.

Factor 1: Pessimistic outlook; systemic, regulatory and policy-driven approaches

Factor 1 has an eigenvalue of 8.43 and explains 11% of the study variance. Seven participants (6 males and 1 female) are significantly associated with this factor. The female participant is involved with a sustainability consultancy agency. One male participant is a resident of the ecovillage Cloughjordan. Three male participants are engineers from research institutions. One male participant is from the city council. The last male participant is in the public sector support of sustainability and environment.

Participants sharing this perspective are in general pessimistic about the sustainable development outlook in Ireland, since initiatives in Ireland are passive on a global scale. They argue that the pessimistic outlook of sustainable development in Ireland is due to inadequate contributions to discussions around the values in sustainable development. The majority is not concerned about sustainable lifestyles. For those who are aware, they are not motivated to act sustainably. There are very few transition movements and also very few opportunities and resources for the public to engage in sustainability activities. The Irish government and the media are also not communicating clearly the concepts of sustainability.

Participants further argue that the three dimensions in sustainable development should be compatible and integrated.

In this perspective, participants are against the business-as-usual, economic approach in sustainable development. They favour a systemic change to tackle sustainable development problems and transition the society forward. They regard policies more effective than bottom-up, inclusive frameworks of communication, such as community initiatives. They also support science and technology innovations, despite recognizing the risk of demeaning societal definitions of sustainable development and the challenge in the collaboration between the academia and industry. There is also general mistrust in the Irish industries/corporations driving their sustainable development agendas and claiming that they are demonstrating authentic sustainable operations.

Participants sharing this perspective do not regard communication strategies an effective way to engage the public. They also do not regard communicating the complexities and diversity of various opinions in sustainable development a huge deal. However, they recognize the importance of stakeholder collaborations.

Factor 2: Optimistic outlook, inclusive communication model; however not excluding other approaches (i.e systemic and economic)

Factor 2 has an eigenvalue of 1.49 and explains 11% of the study variance. Six participants (5 males and 1 female) are significantly associated with this factor. The female participant is an engineer at a research institution. Two male participants are involved in the public sector support of sustainability and environment. One works at a sustainability consultancy; one belongs to the political green party. The other one is a resident of the ecovillage Cloughjordan.

Compared with participants sharing perspective 1, participants sharing perspective 2 have a more optimistic outlook on the current sustainable development in Ireland. They argue that the general public is aware of environmental consequences and that they are willing to change their behaviours. The current society is not merely adopting a business-as-usual model, and sustainable development theories are compatible with practices. Public consultation in environmental issues is not challenging, and the Irish government and media are doing well in communicating sustainable development issues. There are also examples of

the academia collaborating with the industry. Ireland is adopting a holistic and integrative approach in sustainable development. Science and innovations do not result in public discords. However, the participants are a bit doubtful about the authenticity of the Irish corporations/industries' sustainable operations.

Participants sharing this perspective support the economic agenda in sustainable development, but disagree on using GDP as an indicator to measure the success in sustainable development. Since Ireland is passive in sustainable development policies on a global scale, adopting more regulations would be effective. An inclusive sustainable development communication model is also proposed by participants sharing this perspective, which includes both experts and non-experts to discuss human values in sustainable development. They also emphasize on more sustainable development education for the general public. Participants further recognize the importance of stakeholder communication, since communicating sustainable development needs to address and translate the needs for various stakeholders. However, they point out the difficulty of engaging individuals and achieving long-term behavioural change.

Factor 3: Inclusive communication approach, excluding the economic approach

Factor 3 has an eigenvalue of 1.54 and explains 11% of the study variance. Four participants (3 females and 1 male) are significantly associated with this factor. The male participant works at a sustainability consultancy. One female participant is a sustainability researcher at a research institution, another one is involved with sustainability initiatives, and the third female participant is from NGOs.

Participants sharing this perspective feel that Ireland needs to combine sustainable development theories closely with practice, especially since the environmental and economic dimensions are not integrated at this moment. Time should not be a limitation on achieving sustainable development goals, as there are ample opportunities in science and technology innovations.

Similar to participants sharing perspective 2, participants sharing perspective 3 argue for an inclusive sustainable development model to drive individual behaviours. They argue that individual contributions could have a great impact on sustainable development. However, they do not consider sustainable development education an effective solution. Participants

also argue that the general public is aware of sustainability, but there are not enough opportunities for them to engage in sustainable activities. As a consequence sustainable lifestyle has not become a norm in the Irish society and consumptions are still revolved around a business-as-usual model. Participants sharing this perspective therefore argue against an economic driven approach, or using economic frames in sustainable development communication. They are also doubtful of Irish corporations/industries' so-called 'sustainable operations', even though they feel that the current sustainable development outlook is not dominated by the corporations/industries. However, they do think that GDP could be used as an indicator to measure the success of sustainable development.

Participants sharing this perspective think highly of stakeholder collaborations in sustainable development and effective communication strategies, such as persuasive propositions and champions to lead sustainable development initiatives. They think that there is a lack of effective communication from the media in addressing especially science issues.

Factor 4: Firm believer in the economic dimension driving the sustainable development outlook, with regulatory, expert-driven approaches

Factor 4 has an eigenvalue of 1.11 and explains 4% of the study variance. One male participant is significantly associated with this factor. He is a stakeholder from *The Green Way*.

This participant has a strong belief in the effectiveness of using economic drivers, technological innovations and industries to lead the sustainable development outlook in Ireland. He is optimistic about the current sustainable development status in Ireland, where the general public has opportunities to engage with sustainable development and that awareness of sustainable development is adequate. There are good examples of transition movements and some people are adopting sustainable lifestyles. Ireland's sustainable development is satisfactory despite it being passive compared to the global scale.

Unlike adopting an integrative approach in sustainable development argues by the participants sharing the previous perspective, he argues that such approach is merely an ideology, and that it is only possible to mobilize and communicate to the majority with economic benefits. He is a firm believer in Cleantech opportunities and organizations/corporations driving the sustainability agenda in their business operations. He

points out that science and technology could be effective and instrumental tools to support sustainable development policies. He further emphasizes on an open-market approach in sustainable development, where it would be effective to use economic growth as an indicator for sustainable development policies. In conclusion, economic development could drive the sustainable development outlook in Ireland and once it is achieved the other dimensions would be easily achieved as well.

Similar with participants sharing the perspectives in Factor 1 in the five-factor solution, this participant also regards systemic and regulatory approaches more effective than individual drivers. He does not consider an inclusive sustainable development model ideal, such as treating experts and non-experts equally. Since there are huge barriers in public consultation, individual and ground-level incentives are not effective.

Regarding the communication challenge and especially the complexity of sustainable development, the participant emphasize on the proposition of *The Green Way* for stakeholders, the lack of concrete communication from the government, as well as misleading concepts from the media. The participant does not regard stakeholder communication as a top solution for sustainable development in Ireland. He thinks that stakeholders have mutual understanding of the objectives in sustainable development, and therefore new communication protocols are not necessarily needed.

Factor 5: Pessimistic, against the economic, science and technology agenda; apply ground-level approaches

Factor 5 has an eigenvalue of 1.21 and explains 11% of the study variance. Five participants (3 males and 2 females) are significantly associated with this factor. One female participant is involved with the local authority, the other one works with community initiatives. Two male participants are residents of the ecovillage Cloughjordan, while the third male participant is involved with environmental film industry.

Participants sharing this perspective have a pessimistic outlook of Ireland's passive actions in sustainable development policies and the failure to integrate sustainable development theories with practices. They are concerned about the lack of sustainable behaviours among the public, and their indifference towards environmental consequences. The current society is adopting a business-as-usual model, and sustainability is not a priority for the majority.

People have very different ideas about what sustainability is, and there is no mutual agreement on sustainable development solutions. As a consequence, it is very difficult to motivate those who are not interested in sustainability to even see short-term behavioural change. Public consultation in environmental issues is also challenging and requires a lot of efforts.

Participants sharing this perspective are also against an economic-driven and science and technology dominant agenda in sustainable development. They argue that science and technology dominance would often result in public discords, due to the lack of clarity in communication around scientific issues. The complexities of science and technology should be addressed instead of framing merely the economic benefits. They are also doubtful about the authenticity of Irish corporations/industries' sustainability operations, even though they recognize collaboration efforts between the academia and industry around sustainable development.

Rather than a systemic, top-down solution to drive sustainability in Ireland, participants think that engagement on the ground-level could be effective, where NGOs could offer community initiatives via concrete and simple examples. However, they don't regard stakeholder communication as equally effective.

6.2.2.3 Six-factor solution

This section outlines a summary for interpretations with six-factor solution. Interpretations are carried out by referring to the crib sheet as well as participants' responses during the post-sorting interviews. Descriptive titles are attached to each of the factors for the purpose of comparing and contrasting distinctive perspectives among different factors. In the following paragraphs, the statistical data regarding each particular factor in the six-factor solution is summarized, followed by an overview of the main concepts extracted from that particular factor.

The six-factor solution is selected as the final factor solution for this study. Rationales for selecting this solution is elaborated in section 5.3. In the next chapter, we will elaborate further on the interpretations for the six-factor solution by incorporating participants' quotes from their post-sorting interviews, as well as supported factor scores from the factor analysis results.

Factor 1: Pessimistic outlook, systemic approach, communication is not the priority in sustainable development solutions

Factor 1 has an eigenvalue of 8.46 and explains 8% of the study variance. Three participants are significantly associated with this factor. Two of them, both female participants, belong to the same sustainable development consultancy agency. The male participant is an engineer at a research institution.

Participants sharing this perspective have somewhat pessimistic views regarding the sustainable development outlook in Ireland, which is adopting a growth, business-as-usual model. The general public does not take sustainable lifestyles seriously. This is probably due to limited opportunities for the general public to engage with sustainable development, and unbalanced distribution of resources. Despite some positive examples, such as niche efforts in community-driven sustainable initiatives such as Cloughjordan Ecovillage, communication, especially in the media, does not lead Ireland towards a positive outlook in sustainable development. There are also general distrusts for the Irish industries/corporations' efforts in sustainability. Participants sharing this perspective think that the business agenda is still dominant and the main driver for any sustainable efforts in the corporations/industries is the business agenda and profits. In other words, the corporations/industries are not communicating sustainability authentically.

Participants warn big risks with the currently business-as-usual/economic approach in Ireland, since economy and growth will not determine the success of sustainable development. Therefore, GDP indicators should not be used to measure the success of sustainable development. Participants agree on a systemic approach with the current issues in sustainable development for Ireland. They believe that by approaching sustainable development issues from a top-down approach, Ireland would be able to measure and observe concrete impacts on a long-term basis. Environmental policies and regulations would be more effective in achieving a sustainable environment rather than focusing on incentivising tools to mobilize individual sustainable behaviours. Participants argue that Ireland needs to work on global scale of sustainable development approaches given that the current sustainable development status is reactive. They argue that less efforts should be spent on public consultation, which is time-consuming.

Regarding communication around sustainable development, participants argue that the 'wicked' nature of sustainable development is not the major cause of the barrier in communication. It is more related to 'how' to communicate, rather than 'what' is being communicated. For example, it is more effective to show people sustainability examples rather than communicating abstract ideas. Participants also question the effectiveness of stakeholder communication. Despite their supports in dialogues to solve complexities in sustainable development, they argue that adopting an inclusive, equal sustainable development communication model for both experts and non-experts would not be ideal. The same applies to focusing tremendously on educating the general public with knowledge in sustainable development. Participants sharing this perspective prefer communication around sustainable development being driven by experts. However this does not imply an exclusive sustainable development communication model for only experts, they argue. Participants also think that stakeholders have similar visions regarding what sustainability and sustainable development are, and that everyone wants sustainability despite the lack of sustainable actions in Ireland.

Factor 2: Optimistic outlook, inclusive communication

Factor 2 has an eigenvalue of 1.54 and explains 10% of the study variance. Three participants, all males, are significantly associated with this factor. One of them belongs to a sustainable development consultancy agency and two of them are working in the public sector of sustainability and energy.

Different from participants sharing perspectives in the previous factor, participants sharing this perspective has a rather optimistic outlook of sustainable development in Ireland. Both the Irish government and media are contributing positively to the communication of sustainable development in Ireland. They also think that the Irish public are not totally indifferent to environmental consequences, and people don't need to be incentivised through economic benefits to behave sustainably. Sustainable development theories and practices are compatible and inform each other, for example, the transition movements like the Ecovillage in Cloughjordan. The societal definitions in sustainable development are not overlooked or over-emphasized by science discourses, since there are little public discourses/discords in science and technology debates. There are also no apparent abuse of science and technology in sustainable development policies. Green washing is not considered

a major issue in Ireland. In fact, participants agree that there are definitely successful examples of how the industry collaborates with the academic in large-scale sustainable development projects. Participants argue that due to an optimistic outlook of sustainable development in Ireland, people should not put time limitation on sustainable development efforts.

Participants sharing this perspective focus on the communication approaches in sustainable development. They think that communicating sustainable development is about communicating the human values. They further point out the core communication problem: stakeholders having diverse visions of sustainable development. As a consequence, there is a need for them to collaborate on seeking mutual sustainable development policies and objectives. Participants regard the evaluation of stakeholder communication in sustainable development important and believe that fostering stakeholder communication would support the implementation of sustainable development policies.

As a consequence, they propose an inclusive approach to communication around sustainable development, where sustainability concepts needs to be translated into practical aspects (deliverables and impacts) for different stakeholders. For the public, sustainable development education is essential. At the same time, the public consultation process should not be regarded a nuisance. The participants also emphasize on having a sustainable development communication model without discriminating non-experts. However, communicating sustainable development to the public needs understanding of the intended target groups.

Although participants sharing this perspective agree that Ireland needs to scale-up in sustainable development with global approaches, they do not agree that policies and systemic approaches deliver most effective impacts. Rather, they argue for bottom-up incentives to drive and change individual behaviours. For example, leading examples such as the Ecovillage and tidy towns could serve as the 'champions' for sustainable development efforts. NGOs' expertise in creating individual incentives and concrete, easy-to-do sustainable tasks could help mobilize the public. However, participants also point out the challenge of mobilizing people, arguing that behavioural change might be short-term but become difficult to be assessed on the long term. Also, mobilizing people on individual levels does not necessarily lead to collective engagement of the public.

Factor 3: Pessimistic outlook regarding the Irish public attitudes towards sustainable development

Factor 3 has an eigenvalue of 1.57 and explains 10% of the study variance. Four participants, three female participants and one male participant, are significantly associated with this factor. They all have different profiles in the sustainable development sector.

Despite having similar perspective with participants sharing perspectives in Factor 1, that Ireland needs to 'step-up' from current sustainable development policies and strategies, and that economic success does not determine the overall sustainable development success, participants sharing perspectives in Factor 3 feel that the major barrier lies in the general Irish public and the dominance of science discourse in sustainable development.

In general, there is a huge individual indifference towards environmental consequences and the Irish society is nowhere near being sustainable. People do not take sustainable lifestyles seriously and there exists low environmental awareness. Even if people are aware of environmental consequences, they are not motivated to contribute to the environment. As a consequence, transition movements are only in niches and any forms of environmental public consultation process is a challenge, alongside with very short-lived behavioural change impacts. Participants sharing this perspective, however, think that the lack of sustainable motivation and behavioural change is intrinsic, and has not so much to do with media influence.

Participants also regard the dominance of science discourse a negative impact on the sustainable development outlook. They do not think science and technology is the most effective means in achieving sustainable development objectives despite various collaborations between the industry and the academic, and argue that the Irish government are abusing science and technology in the process of drawing up sustainable development policies, for example Cleantech and preaching to people to adopt technologies.

There is mutual agreement on the 'wicked' nature of sustainable development, which contributes to the difficulty of communication around sustainable development, especially for different types of audiences. Participants also emphasize on the connection between sustainable development theories and practices, stating that they should be compatible and inform each other.

Participants sharing this perspective suggest that sustainable development efforts should start from the individual levels, and that communication strategies should target all, regardless of people's interests. Stakeholders in the field of sustainable development should also figure out new ways to communicate controversial scientific issues. Similar with participants who share perspectives in Factor 2, participants here do not believe the impact of sustainable development policies and regulations exceeding individual drivers in environmental behaviours.

Factor 4: Multiple challenges, multiple solutions; contradictory, a little fatalistic perhaps?

Factor 4 has an eigenvalue of 1.18 and explains 10% of the study variance. Five male participants are significantly associated with this factor. Three of them are from the public sustainability and environmental sector and two of them are residents of the Cloughjordan Ecovillage.

Unlike the other factors, participants sharing this perspective discuss multiple challenges and multiple solutions for sustainable development in Ireland. They believe that Ireland is running out of time to safeguard a sustainable future, especially when sustainable development policies and strategies are reactive compared to international standards.

The challenges include the lack of participation from the general public in sustainable lifestyles and the huge gap between environmental awareness and real actions. The sustainability outlook is not very optimistic due to Ireland adopting a business-as-usual model. Participants also argue that economic success does not determine sustainable development success. In fact, the environmental and economic dimensions should be connected to integrate the three pillars in theory as well as in practice.

Participants sharing this perspective discuss some possible solutions to these challenges. Regarding science and technology being a potential means to achieve sustainable development, the challenges lie in the collaboration between the industry and academic. There are also risks in science and technology taking over societal debates in sustainable development, which result in public discords.

Regarding mobilizing the public, participants point out that incentives which involve easy-to-do, community activities might be effective. However, participants sharing this perspective believe that the transition towards a low carbon footprint society can't be easily

achieved via merely creating individual incentives, since individual engagement does not necessarily imply engagement on a collective level. Regarding stakeholder communication, participants sharing this perspective regard dialogues and auditing the process of communication important in tackling sustainable development challenges. However, they do not advise too much focus on strategic approaches, such as the communication proposition for stakeholders, or creating champions. Despite mutual agreement on an inclusive sustainable development communication model being ideal, participants do not regard a model where experts and non-experts should be treated equally.

Factor 5: Strategic communication to enhance integrative approaches in sustainable development

Factor 5 has an eigenvalue of 1.14 and explains 10% of the study variance. Two males and two females are significantly associated with this factor. Two male participants are from research institutions and the two female participants are from sustainable development consultancy agency.

Factor 5 is highly correlated with Factor 1, 2, 3, and 4. However results still imply a different outlook on the sustainable development challenges and solutions for Ireland. Participants sharing this perspective point out the lack of an integrative approach in the current sustainable development in Ireland. This is especially evident in the disconnection between the environmental dimension and the economic one, which results in the challenge of public consultation process and public discords due to science and technology debates. Participants argue that sustainable development should not solely depend on the market and industry. In fact, sustainable development theories and practices should inform and shape each other.

Unlike those sharing perspectives in Factor 3, participants sharing this perspective do not think that there is a huge gap between the general public's environmental awareness and behaviours. They also argue that time should not be regarded as a limitation to solve sustainable development challenges. There are still positive examples in sustainable development efforts, such as Cloughjordan Ecovillage.

Regarding the economic discourse, participants share similar perspectives with those in Factor 1, 3, and 4, in which economic success does not determine sustainable development success. Therefore, communicating merely the economic benefits of sustainable

development will not be ideal. However, participants sharing this perspective think that GDP should be considered part of sustainable development.

Participants sharing this perspective propose a strategic communication approach to enhance the integration of sustainable development dimensions. Concrete and persuasive communication strategies are essential for a variety of target audiences. Sustainable development communication should also adopt open, transparent, and inclusive stakeholder dialogues to enhance stakeholder collaboration.

Factor 6: Firm believer in the economic dimension driving the sustainable development outlook, with regulatory, expert-driven approaches

Factor 6 has an eigenvalue of 1.06 and explains 5% of the study variance. One male participant is significantly associated with this factor. He is a stakeholder from *The Green Way*.

This participant has a strong belief in the effectiveness of using economic drivers, technological innovations and industries to lead the sustainable development outlook in Ireland. He is optimistic about the current sustainable development in Ireland, where the general public has opportunities to engage with sustainable development and that awareness of sustainable development is adequate. There are good examples of transition movements and some people are adopting sustainable lifestyles. Ireland's sustainable development is satisfactory despite it being passive compared to the global scale.

Unlike those who argue for an integrative approach in sustainable development, he argues that it is merely an ideology, and that it is only possible to mobilize and communicate to the majority with economic benefits. He is a firm believer in Cleantech opportunities and organizations/corporations driving the sustainability agenda in their business operations. He argues that science and technology should be used as instrumental tools to support sustainable development policies. He further emphasizes on an open-market approach in sustainable development, where it would be effective to use economic growth as an indicator for sustainable development policies. In conclusion, economic development could drive the sustainable development outlook in Ireland and once it is achieved the other dimensions would be easily achieved as well.

Similar with participants sharing perspective in Factor 1, this participant also regards systemic and regulatory approaches more effective than individual drivers. He does not consider an inclusive sustainable development model ideal, such as treating experts and non-experts equally. He further points out that since there are huge barriers in public consultation, individual and ground-level incentives are not effective.

Regarding the communication challenge, the participant emphasize on the proposition of *The Green Way* for stakeholders and the lack of concrete communication from the government. This participant does not regard stakeholder communication as a top solution for sustainable development in Ireland. He thinks that stakeholders have mutual understanding of the objectives in sustainable development, and therefore new communication protocols are not needed.

6.3 Selecting the final factor solution for this study

Cuppen et al. (2010) have questioned the procedure for identifying and selecting factors in Q methodology, since factor analysis is not a straightforward task, especially regarding complex environmental issues. For the final interpretation of this study, we consider and compare the quantitative factor analysis results among four, five, and six-factor solutions, and also the capacity of each factor solution in offering qualitative interpretations.

Regarding the quantitative results from the factor analysis, adding more factor solutions increases the total study variance. From the quantitative factor analysis results, the four-factor solution offers 44% study variance, the five-factor solution offers 48%, and the six-factor solution offers 53% of the study variance. However, it could be observed in this study that increasing the number of factors only slightly increases the total variance (by 4% from 44% to 48%, and 5% from 48% to 53%). The small differences in the study variance among four-, five-, and six-factor solutions indicate that choosing the most suitable factor solution based solely on the highest study variance would not be ideal.

To select the most suitable factor solution for this study from the quantitative perspective, the factor correlations are also taken into account. If two factors in the factor analysis solution are significantly correlated, it suggests that they might manifest around the same perspective (Watts & Stenner 2012). It could be observed that Factor 3 in the four-factor solution (see 6.1.5, Table 6.7), Factor 4 in the five-factor solution (see 6.1.5, Table 6.8), as

well as Factor 6 in the six-factor solution (see 6.1.5, Table 6.9) have low correlations with other factors. The low correlations imply that these factors in each of the factor solution capture most unique perspectives. However, besides these factors, correlations between other factors in four-, five-, and six-factor solutions remain quite significant, indicating that there are overlapping concepts among them.

The difficulties in justifying the most suitable factor solution based on the quantitative results bring us to further examine the qualitative factor interpretations from the summaries of four-, five-, and six-factor solutions (see 6.2). We observe the following phenomena:

- The perspective describing the need for a systemic approach in sustainable development for Ireland is shared among four-, five-, and six-factor solutions;
- The perspective proposing an inclusive communication approach in sustainable development for Ireland is shared by five-factor and six-factor solutions;
- Both five-factor and six-factor solutions capture the perspective of an economic and technology-driven approach to sustainable development in Ireland;
- Both four-factor and six-factor solutions capture the perspective around Irish public's indifference towards the environment being a major issue in sustainable development;
- The perspective describing the incapability to deal with multiple challenges and solutions in sustainable development in Ireland is shared by four-factor and six-factor solutions;
- The six-factor solution is the only one who captures the perspective which proposes strategic, integrative communication around sustainable development in Ireland.

From the quantitative analysis and qualitative observations, it is clear that the six-factor solution offers the most complete scope of perspectives. For the full interpretation of the factor analysis results, we select the six-factor solution for the final analysis. An in-depth interpretation and discussion of the six-factor solution is elaborated in the next chapter, Chapter 7. The six-factor solution also provides guidelines for developing requirements for a communication toolkit (see Appendix A).

Chapter 7 Q Methodology Study: Six Types of Perspectives around Sustainable Development in Ireland

This chapter presents in detail the six types of stakeholder perspectives around sustainable development in Ireland with in-depth analysis and discussions on each type of perspectives, their implications on sustainable development in Ireland, as well as how they tease out the strengths and weaknesses for stakeholder communication around sustainable development in Ireland. This chapter also incorporates a participants' feedback discussions on the Q methodology study results (see 7.3.3) to evaluate whether the Q methodology study captures the current stakeholder perspectives around sustainable development in Ireland, whether the participants recognize and identify with the six types of perspectives, as well as identify missing perspectives.

The analysis on the six types of perspectives around sustainable development in Ireland also inform the design requirements of a stakeholder communication toolkit in sustainable development, which is an unique part of our study, linking empirical analysis with practical outputs (see Appendix A). From a methodological perspective, the analysis in this chapter also demonstrates how the qualitative interpretations incorporate the factor analysis results from the previous chapter, Chapter 6.

Section 7.1 presents the full interpretations of the six types of stakeholder perspectives, supported by participants' rationales from the post-sorting interviews, while section 7.2 elaborates on the implications of each perspective. Section 7.3 discusses the analysis of this study from an integrative perspective, focusing on the shared communication modalities of the six types of perspectives, the similarities and differences across the six types of perspectives, the feedback discussions from the participants regarding the Q methodology study results, and the opportunities and challenges of communication with these perspectives. Section 7.4 discusses the limitations of the Q methodology study.

7.1 Full interpretations of the six-factor solution

This section presents the full interpretation of the six factors. Table 7.1 presents an overview of the six types of perspectives, including a short summary of the factor analysis results and a short description attached to each of the six perspective.

Perspective Type	**Factor analysis results**	**Description**
Type 1: Environmentalism with new regulatory regime	eigenvalue: 8.46 study variance: 8% # of participants: 3	Pessimistic about Ireland adopting a growth model in sustainable development; sustainable development model in Ireland should be systemic, expert-driven, government-led
Type 2: Postmaterialism and egalitarianism	eigenvalue: 1.54 study variance: 10% # of participants: 3	Optimistic, inclusive stakeholder communication
Type 3: Environmental efficacy with public mobilization	eigenvalue: 1.57 study variance: 10% # of participants: 4	Pessimistic regarding the Irish public's attitudes towards sustainable development
Type 4: Fatalism in sustainable development	eigenvalue: 1.18 study variance: 10% # of participants: 5	No consensus on solutions for multiple challenges; fatalistic
Type 5: Strategic Communication	eigenvalue: 1.14 study variance: 10% # of participants: 4	Strategic communication to enhance integrative approaches in sustainable development
Type 6: Technocratic Solutions	eigenvalue: 1.06 study variance: 5% # of participants: 1	Cleantech and economic dimension should drive the sustainable development outlook,

		with regulatory, expert-driven approaches

Table 7.1 An overview of the six types of perspectives

To interpret the factors, the researcher needs to identify associations between Q statements from a holistic approach (Davis & Michelle 2011). During the analysis in this section, the factor scores of the Q statements are used as indicators to see how the Q statements are scored in each of the six factors, since factor scores are able to explain idealized Q sort patterns for each factor (see 6.1.6, Table 6.12 for the complete factor scores for the six-factor solution). The open-ended discussions following the Q sorting process (see 3.4) also aid the interpretations of each factors (Shinebourne 2009).

In interpreting the six-factor solutions, we first provide some descriptions for each factor. This is very common in Q methodology studies and helps the reader comprehend the results (Curry et al. 2012). In the following subsections (7.1.1-7.1.6), we also summarize the quantitative results from Chapter 6 for each factor. The titles of each factor are further refined in section 7.2. The interpretations of each factor are supported by quotes from the participants during the post-sorting interviews. The associating Q statements and factor scores are presented in the format of (A: B). A indicates the statement number. B indicates the factor score for that particular statement. For example, (01: +5) in the interpretation for Factor 1 would indicates associations with statement #1, which receives a factor score of +5. To ensure stakeholders' confidentialities, we numbered the participants. In total there are 28 participants, numbered #1 to #28.

7.1.1 Factor 1: Pessimistic about Ireland adopting a growth model in sustainable development; sustainable development model in Ireland should be systemic, expert-driven, and government-led

Factor 1 has an eigenvalue of 8.46 and explains 8% of the study variance (see 6.1.4, Table 6.6). Three participants are significantly associated with this factor. Two of them, both female participants, belong to the same sustainable development consultancy agency. The male participant is an engineer at a research institution.

Participants loading onto this factor have somewhat pessimistic views regarding the economic dimension driving the sustainable development outlook in Ireland, due to the prioritization of a growth model (47: +5). Participant #6 states that the existing economic model is the root of unsustainability in Ireland: ''I personally believe that our issues with sustainable development is that we are caught up in a booming bust, you know, market economics, which I believe is the root cause of our unsustainable lifestyles''.

Participant #10 further points out that using the economic argument is an easy narrative to discuss solutions for sustainable development problems, and therefore the economic argument is adopted by mainstream debates around the economic dimension in sustainable development:

> It's [the economic argument] perfect in the context we find ourselves in, where all the perceptions of our problems is about economic damage. It's a very easy narrative to suggest that growth is going to be that solution. The problem was that the only solution for sustainable development is growth. That leaves out the possibility that the sustainable challenges that have already been achieved weren't sustainable. I'm not saying that's not necessarily the case, but it's a possibility that needs to be discussed and can't be ruled out. And consider the possibility of getting back to growth- it may not be possible. But even if it were possible, if it is desirable? (#10)

The general public does not take sustainable lifestyle seriously (23: +4). Participant #6 claims that unless there is a huge social switch in sustainable behaviour norms, the impacts of individual behaviours remain limited and the general public is indifference about their individual contributions in the environment:

> Sustainability is talked about a lot in the media, and in general people are aware that there is a wider problem. But they feel, and they are, that their individual actions aren't going to make a difference. And this is reflected in the ways and they are still going on Ryanair flights and they are still put a lot of waste into the landfill. But if there was a social taboo, if that is considered to be evil and bad thing to do, that would actually change, because that would have huge impacts. It wouldn't have been individual changing, but it would, because it is a taboo, in which it would affect a far greater number of people. I think that is the only way in which individual actions would make an impact- is that if you have a taboo- a positive individual impact.

> Individual actions, I don't think would have huge impacts. Unless you have a huge social switch and social behaviour, and social norms. Only then would it have a great impact. (#6)

The lack of public behaviors in sustainability is also related to limited opportunities for the general public to engage with sustainable development, and unbalanced distribution of resources (26: +1). Despite positive examples, such as niche efforts in community-driven sustainable initiatives like the Cloughjordan Ecovillage (33: 0), communication, especially in the media, does not lead Ireland towards a positive outlook in sustainable development (40: +2). A lot of the conversations around sustainable development are 'happy talks', which fail to engage the society in the scale of complexity, says participant #10:

> I mean, media catchwords are too simple on almost every topic, that's the danger of catchwords. But in particular, on this [sustainable development] subject, it just orients people and misdirect usually half of the general public. I think that...my experience with the media anyways, they are not engaging...in the scale of problems- a lot of the happy talk and not engaging with possibilities and difficult choices. (#10)

For example, participant #5 points out that the current Irish government is mainly trying to achieve the economic dimension in sustainable development by focusing on unemployment issues. However, participant #5 thinks that creating more jobs will not deliver tremendous benefits as expected:

> I do agree that Ireland is giving some of the services to sustainability but really a lot of the discussions are about getting back to growth, getting people hired, all of which is not relevant or it might even be kind of misleading to try and get an idea that everyone is going back to employment, that we are going to have another construction built in the same way- those things are very...those things aren't as good for Ireland as people think they were, so there is too much getting back to growth, and not getting to sustainable development. (#5)

There are also general distrusts for the Irish industries' or corporations' efforts in sustainability. Participants sharing this viewpoint think that the main driver for corporations' and industries' sustainable efforts are their business strategies (11:+5). Participant #6 also

thinks that the sustainable element in Irish corporations and industries is merely reflecting their marketing strategies:

> Yep, we come across this every day in the work that I do. Every time that you've taken on a corporate responsible role, with corporate. You know, corporations who've taken on CSR measures, and it's been driven by marketing department. And it's been done in order to reflect on their marketing. And people are so aware of this that the development departments are pitching its activities to its departments. So if you want to get involved in the green building council, to lobby for change in regulations, the main reason you are going to do it is because you can market yourself. (#6)

Participant #10 further adds that Irish industries and corporations incorporate sustainable development in their operations to avoid ethical problems. In other words, the corporations and industries are not committed to sustainable development authentically (39: -4):

> In my view, by and large, Irish industries, globally are keen to have their voices heard, not because they want to promote their sustainable development, because they want to avoid any constraints and freedom of action so they will dress that up. Of course there are exceptions to this, that there are good actors there in industry, and there are individual people in industry...but industry in general, then I don't think they want to have their voices heard in demonstrating their commitments to...taking their commitments, yes, demonstrating them, no. (#10)

Participants warn of an ineffective communication outcomes with the currently emphasis on the economic agenda in Ireland (29: +3), since economy and growth will not determine the success of sustainable development (51: -5). Participant #5 points out that sustainable development problems are contested. Thus it is not possible to solve the holistic problems in sustainable development from a single perspective. ''The fact that everything would fall in proceeding the economic driver I disagree. I don't think it's only the economic problem that needs to be solved, plus society problems. We can't really solve the economic dimension anyways. It is a simple statement and everything is too complex to be true,'' she says.

Participant #6 further points out that narrowing on the economic dimension in sustainable development would lead Ireland towards a sustainable future. Instead, Ireland should re-evaluate existing resources and reprioritize:

> I don't think everything is just about the economy. Sustainable development shouldn't, or can't be looked at through the lens of economic dimension. That's really why we are failing in the world today because we are seeing things through the economic dimension. We actually have to relook at how we view resources, or value systems, what we think is important, because that's the problem, what we are thinking about. (#6)

This factor captures the perspective that economic indicators such as GDP should not be used to measure the success of sustainable development (48: +4). Rather, participant #5 argues that indexes such as measuring the happiness of societies should be used. ''I think the liveability indexes and other indexes that talk about impacts to society, happy society, are much more about sustainable development then just the economic development measure, '' says participant #5.

Participants agree on a systemic approach with the current issues around sustainable development in Ireland. They believe that by approaching sustainable development issues from a systemic approach, Ireland would be able to measure and observe concrete impacts on behavioral change in sustainability on a long-term basis (16: -3). For example, environmental policies and regulations are more effective in achieving a sustainable environment in Ireland (24:+4) than focusing on incentivising tools to mobilize individual sustainable behaviours (15: 0). Participant #6 argues that efforts in sustainable development create more impacts when they research national and international levels, as well as when corporations contribute. For example, climate change issues require regulations and collaborations globally to mitigate carbon footprint:

> Individual actions are fruitful unless it is national level, international level. But I also believe that it is corporate level if you are actually counting carbon, if you are really looking at climate change, that has to be done at a national, international level. The only way the individual impact is going to make any impact is if it is some sort of social taboo. (#6)

Participant #10 also points out that problems are collective, and that Ireland should be leading successful sustainability examples rather than being indifferent to environmental impacts or assuming that these impacts are negligible:

> Well, yeah, if policy turns into implementation, it's policy at the national and international level that's going to create real impacts. Problems are collective, the problems of scale, individual people could be engaging at a highly destructive consumption, but the planet is a big planet, and that could work on the problem of scaling, so at the end of the day it has to be national level. It's interactive of course, there's an easy argument that says, as a small country like Ireland we don't have to worry, because at the end of the day what we do whether it's good or bad has negligible impact. And in the material sense that might be approximately true, but in a cultural context it is obviously not true. Even small players who insist in acting on a purely self-interest basis makes it difficult for big players to collaborate. In fact there is responsibility for small nations like Ireland to lead this [sustainable development], because it should be easier. (#10)

This factor also captures the perspective that Ireland is reactive in sustainable development policies compared to global efforts (22: +2). Public consultations in environmental bills and policies could be time-consuming (25: +1).

Regarding communication around sustainable development, the 'wicked' nature of sustainable development is not the major cause of the barriers in communication around sustainable development (07:-3). The barriers in communication around sustainable development is more related to the strategies of communication, rather than the messages that is being communicated. For example, it is more effective to show people sustainability examples rather than communicate to them abstract ideas of sustainability (35: +3). However, taking more efforts to investigate and evaluate the contribution of stakeholder communication in sustainable development is not considered very important in this factor (05: -2), despite the fact that this factor captures the notion of having more stakeholder dialogues to tackle complexities in sustainable development (01: +2).

Participants associating strongly with this factor argue that adopting an inclusive sustainable development communication model which invites both experts and non-experts in the environmental decision-making process in Ireland would not be ideal (52: -4). Participant #5

explains that it is essential to have evidence-based discussions in sustainable development, and there is a danger for the lay public to participate in sustainable development decision-making without sufficient knowledge:

> You don't want a citizen to say, you know, it's just sustainable to bring in badgers as it is to bring in...you want science. So they[experts and non-experts] shouldn't be equal, but their ability to, I suppose, to be engaged in sustainability, should be equal. But they [the lay public] definitely need some science behind. (#5)

However, this factor does not emphasize educating the general public with knowledge in sustainable development (53: -1). This implies that participants who associate with this factor prefer the sustainable development agenda being driven by experts only.

Participants also think that stakeholders in Ireland have similar visions regarding what sustainability and sustainable development should be (27: -1), and that everyone wants sustainability despite the lack of sustainable actions (32: -4). Participant #6 further points out that discords exist in the approaches to achieve sustainable development, not the visions of sustainable development, since the definitions of sustainable development are very clear and simple. ''I don't believe that environmentalists, governments and politicians, and businesses have diverse visions. I think everybody agrees what sustainability is, I think everybody agrees what sustainable development look like. It's the 'how you do it' that is different, it's not the vision. The vision is quite clear,'' says participant #6.

7.1.2 Factor 2: Optimistic outlook, inclusive stakeholder communication

Factor 2 has an eigenvalue of 1.54 and explains 10% of the study variance (see 6.1.4, Table 6.6). Three male participants are significantly associated with this factor. One of them belongs to a sustainable development consultancy agency and two of them are working in the public sector support of sustainability and environment.

Different from Factor 1, Factor 2 have a rather optimistic outlook of sustainable development in Ireland. Both the Irish government and media are contributing positively to the communication of sustainable development in Ireland (37: 0; 40: -1). The Irish public is not totally indifferent to environmental consequences (19: -4), and people don't need to be incentivised through economic benefits to behave sustainably (14: -4). Participant #4 argues

that rather than being indifferent to the environment, the public is just 'eco-fatigued' due to information overload. He also points out that initiatives such as grow-your-own-food demonstrate that sustainability is still very popular among the general public:

> I wouldn't say that the general public is immune to the environmental impacts because I think there is a eco-fatigue, environmental-fatigue; people have heard about green things for so long that it just sort of goes into one ear and out from the other. But I don't think they are immune, I think it is still a hard core for people. An example of that would be there is grow-your-own-food culture, that's growing throughout Ireland. (#4)

Participant #14 also argues that it is unfair to accuse people of being indifferent since people do care about their communities. A good example is the tidy-town initiatives, which have been carried out for over 60 years:

> Yes I agree that Ireland is wealthy in terms of resources but I think it is unfair to say that people are indifferent. Such things as illegal dumping, most people are appalled at that sort of stuffs. People do care about their community that they are living in. I guess one has to look at the tidy-town initiatives, which has been going on for over 60 years- brought great prides of people taking it- that sort of goodwill and to do the right thing and to be proud of where people live. (#14)

Regarding sustainable behaviours, participant #4 believes that instead of economic incentives, regulatory drivers have more significant impacts. He uses the plastic bag tax, smoking ban and the Dublin Bikes as examples, explaining that once the public recognize the benefits for the environment, they discard the negative associations with the project:

> I think we can change, regardless of benefits, because sometimes we are into regulatory drivers. For example, plastic bag tax which hit people in their pockets but really they realized after a while that's right; ban on smoking as another example, which improves the air quality, and people realized that it is a good thing to do- there was a huge public against it but it was embedded. We were the first European countries to implement bail out smoking in public places. So I think that there are just a couple of examples that Ireland don't like new things. One example is the public bike scheme in Dublin- lots of negativities associated with it in the start, and

> now it's been called one of the most successful bike schemes in the world, and it's expanding. It's an initiative to get people to be more aware of sustainable development. The more cyclists on the road, less cars, the more friendly and more well-designed the city would become. (#4)

Participant #7 further explains that the Irish are not suspicious of change and innovations. Although actualizing change could be difficult, people are willing to change and it is just a matter of showing them the benefits:

> I don't think people in Ireland are, suspicious of change, or would be, would block any type of innovation. I just think that it can be difficult, around actualizing change. It's getting people to think, changing the mindset that can be the biggest barrier. However, I don't think people are unwilling to change. I think it's just trying to get them to understand how this might benefit. (#7)

Participants associating with Factor 2 also regard sustainable development theories and practices compatible and that they should inform each other (36: -5). Otherwise it would be a fallacy, says participant #14:

> I suppose you know, the theory of sustainable development and the interaction and the interrelationships between the different pillars and the attempts to integrate them. I think it's a fallacy to say that they are only compatible in theory and not in practice. I think we often see examples of sustainable development at local level which are very good- they might be carrying the label of sustainable development. I remember 15 years ago there's a debate on local agenda 21. People are investing it, restore old buildings for community use. We see many fine examples, fine examples that might be carrying the label of sustainability. But you know, basically they are initiatives that are fully consistent of sustainable development. (#14)

Participant #4 uses example in Scandinavian countries to demonstrate where countries successfully implement the concepts of sustainable development into their energy initiatives:

> I think there are enough theories involved in understanding economic, social and environmental pillars, how they can be integrated. But I think there are, examples of where sustainable development can, or have worked effectively. I think other European countries, more like in the north- they talk the talk as well as walk the walk

> and in countries like Sweden, Denmark, they have huge reliance on the natural gas. In terms of Ireland, I don't' think there are too many examples in sustainable development. (#4)

Factor 2 points out that in Ireland, there are also collective examples in sustainable development, such as transition movements (33: 0). The societal dimension in sustainable development is integrated well in Ireland (08: -3). The Irish government is not imposing science and technology in sustainable development policies (42: -3), and the general public regard innovations and technologies in a positive way (13: -4). Participant #7 says that the general public is open to sustainability concepts instead of being suspicious about science and technology:

> I think that, sometimes when the debate is open, if you have enough, instead of having top-heavy with, with experts, it can be a lot open and understanding, I don't think people would be, people are necessarily suspicious in the implementation area. I think people are generally open to the concept of sustainability. (#7)

Green washing is not a major issue in Ireland (11: -1). In fact, participants agree that there are successful examples of how Irish industry collaborates with the academic in large-scale sustainable development projects (50: -2). Participant #4, who is from the public sector of sustainability and environment, points out that there are definitely initiatives out there working on collaborative efforts in reducing emissions and energy:

> From our organizational perspective, because we run programs, provide 50 % funding to projects like reduce emissions, reduce water, whereas there are sustainability NGOs. There are definitely initiatives out there, so it's not difficult, it's maybe just difficult to attract them, but not difficult to collaborate if the will is there. (#4)

Factor 2 also emphasizes that discussions around the values in sustainable development should not be limited by time (28: -5). Participant #7 argues that once Ireland gets people on board with similar mindsets, sustainable development goals could be achieved relatively quickly:

> I don't think that we should be putting up any time restriction on trying to get these kinds of concepts out there. I think we definitely put anything on the back burner,

> and these things need to happen now, and they need to be, the dialogue needs to be happening now. But I don't think there is not enough time to tackle these issues. I think once we get the mindset and the kind of action changing, we can quickly move towards, a, resource-efficient, or sustainable development, sustainably developed country. I think that can be achieved relatively quickly once we have people on board. (#7)

Factor 2 also teases out the importance of communication approaches in sustainable development. Communication around sustainable development is about human values and interactions with the nature (18: +3). Participant #4 says that Ireland needs to figure out how communication around sustainable development help define the types of needs:

> It's [communication around sustainable development] human judgment...you know we are focusing on growth...so we have to think hard about how we are meeting our human needs and also look at whether our needs are something that is necessary. In terms of transport habits, entertainment habits; move from a meat-diet towards a vegetarian-diet; more efficient transport patterns, work patterns, that sort of stuffs. (#4)

Participant #14 further argues that more emphasis on human life experiences could strengthen the social capacity in sustainable development:

> Sometimes top-down policies can be very remote. I mean, who knows what's coming out from Rio +20, but yet you can see good activities from the local level, what matters to people. When sustainability is brought down to very local situation, often there are champions who would be stimulus to these kinds of actions. We've seen in things like transition towns in Ireland, this kind of bottom-up initiatives that connect to people what matters to them locally. So the champions- you need champions in terms of achieving actions underground, and what comes from top-down can be enabling as well, but you know it is important to have that dimension as well, and this idea of around inclusion- that's what the social dimension is important- so the drawing on the sort of, you know, wide range of human life experience that might be within community. (#14)

In addition, Factor 2 teases out the core communication problem in sustainable development: stakeholders have diverse visions of sustainable development (27: +3). Ireland needs more multidisciplinary stakeholder collaborations to actualize sustainable development policies (31: +4). Participant #7 explains that sustainable development policies in Ireland need to get across to different sectors, such as social partnerships, local authorities, local governments, and businesses.

Factor 2 also regards the evaluation of stakeholder communication in sustainable development important (05: +2) and believes that fostering stakeholder communication would help identify the complexities around sustainable development (01: +2). For example, participant #7 points out that different backgrounds of stakeholders help iron out issues from different outlooks and approaches:

> Having a good background of different stakeholders kind of help to iron out any issues, I suppose, since people are coming from different backgrounds. So when you do have social partnership, they have a different outlook to maybe the government agenda. People might be from the private sector too. So that helps to tackle challenges of those issues. (#7)

Factor 2 points out that it is challenging to translate abstract sustainability concepts into deliverables and impacts for different stakeholders (45: +5). It is important to address the representativeness of communication around sustainable development in Ireland for all stakeholders (21: +5). Participant #4 points out that bringing in the core values from the sustainable development agenda and communicate them to all levels in the society would be rather challenging:

> I've been involved in some initiatives on some sustainable development agenda. I think there is good effort for them to bring in all levels. But back to the core point where there is a lack of understanding of what sustainable development means, on the streets...that is actually difficult to represent, to all levels within that agenda. (#4)

Participant #7 points out the benefits of partnership and collaboration in Ireland, where sustainable development could be driven more effectively, with more opened stakeholder dialogues:

> Yes I suppose it can be quite difficult, when we are, say, myself and my line of work, that I work closely with so many different stakeholders, some being in the private sector who wouldn't necessarily really be, maybe have, direct knowledge of the technology, or even the legislation. So, I suppose it could be quite difficult to communicate sustainability. And the language around that can be quite difficult, for a range of different stakeholders. However, working through the kind of concept and having an open kind of language and partners can kind of help. (#7)

Regarding public education in sustainable development, Factor 2 regards sustainable development education for the public essential (53: +4). Especially in the curriculum, says participant #4. On the other hand, public consultation process in environmental bills and policies should not be regarded a nuisance (25: -2). Participant #14 especially points out that the communication and engagement of stakeholders in supporting legislative actions are valuable efforts and should be invested:

> Public consultation around legislative process- it might have been difficult and it might have been...but it's not impossible. It's just a matter of putting the efforts in. It's very important, we are talking about communication and engaging stakeholders support for legislative action. The efforts must be put in, front-loaded, at the start, in consultation, and to take into that input, is very valuable. So why, it requires effort in consultation, it shouldn't been seen as negative in a way. It's investing in that is a strength in the process of doing it. (#14)

Participants sharing the viewpoints in Factor 2 also emphasize on having an inclusive communication model by engaging non-experts into discussions around sustainable development (52: +2). However, participant #14 says that communicating sustainable development to the public is especially challenging. The communicator needs to fully understand the intended target groups to deliver effective public messages (54: -3):

> It's [communication around sustainable development] not preaching to the converted, you know. I think that we have to engage all sectors and all levels and we have to reach out, not only in the formulated system, but also in general communication. This stuffs need to be integrated in the process, in terms of public

> discourse, and public messaging. So, we shouldn't be just preaching to the converted here, but the whole society in general. (#14)

Participants sharing the viewpoints in Factor also agree that Ireland needs to scale-up in sustainable development with more active, global approaches (22: 0). Participant #4 complains that progress in Ireland's sustainable development is too slow. ''I think it is moving slower than it should be, but much slower than in the past- it is just really disappointing. We could try and integrate more sustainable development initiatives'' he says.

Different from Factor 1, Factor 2 does not agree that policies and regulations deliver most effective impacts in sustainable development (24: -2). Factor 2 opts for bottom-up incentives to drive and change individual behaviours. For example, leading examples such as the Ecovillage and tidy towns could serve as the 'champions' for sustainable development efforts in Ireland (46: +4). NGOs' expertise (17: +1) in creating individual incentives and concrete, easy-to-do sustainable actions (15: +3; 35: +1) could further help mobilize the public. Participant #14 reflects on the effectiveness of using the emotional approach to connect to the public:

> Again, to send clear signals to people to do the right thing and to connect them, and sometimes on a sort of, emotional level as well, is important. And involving sort of message that are for children because that would connect to their parents, that's also important. (#14)

Nevertheless, Factor 2 also points out the challenge of mobilizing the general public, arguing that behavioural change might be short-term but difficult to evaluate the impact on a longer basis (16: +2). Also, mobilizing people on individual levels does not necessarily lead to collective engagement (12: -3).

7.1.3 Factor 3: Pessimistic outlook regarding the Irish public's attitudes towards sustainable development

Factor 3 has an eigenvalue of 1.57 and explains 10% of the study variance (see 6.1.4, Table 6.6). Four participants, three female participants and one male participant, are significantly associated with this factor. They come from various sustainable development sectors in Ireland.

Factor 3 agrees with Factor 1 that Ireland needs to 'step-up' from current sustainable development policies and strategies (22: 0), and that economic success does not determine sustainable development success (51: -4). Participant #9 from the local authority argues that the economic agenda alone will not successfully achieve sustainable development. She uses the failure of the Celtic Tiger as an example. ''We've already tried that [the economic agenda] with the Celtic tiger and it took us backwards. Without the other two pillars of sustainable development, there is no sustainable development in that perspective,'' says participant #9. Participant #15, who is involved in the environmental film industry, further adds that sustainable development requires a coordinated approach of the three pillars. ''No you can't, you can't, you can't separate out these things. It's about a coordinate approach. There's these three pillars that everyone's mentioned, I mean, to me that's the minimum thing,'' he says.

Factor 3 proposes that the major barrier in achieving sustainable development lies in the general Irish public and the dominance of science and technology in sustainable development. In general, there is a huge public indifference towards environmental consequences (19: +4) and the Irish society is nowhere near being sustainable (06: -5). Participant #9 states that perhaps the lack of awareness in sustainability is due to the Irish society being far removed from environmental consequences such as climate change, and therefore the general public does not yet feel threatened by the environmental consequences resulted from unsustainability:

> We have so much going on for the country, and despite any of the impacts, climate change, we are much sheltered by those impacts, and it says that the general public is immune to the impacts. I think it is because of the wealth of the country, the Celtic Tiger, because of the natural resources of the country, we are very far removed from the environment and how it works and we don't really understand about climate change. (#9)

Participant #13, a researcher in sustainability, feels that Ireland is very far behind in sustainable efforts when compared to other European countries. ''From my experience, in having lived in Germany, they are 20 years ahead on the impacts of environmental issues. So I definitely think there's a big gap'', says participant #13.

Participant #9 also points out that the only sustainable action that is embedded in the Irish public's mind seems to be recycling. Participant #18, who works in community initiatives, does not observe the majority of the Irish adopting the ethos of sustainability in their daily lives:

> It's trendy to talk about sustainability and sustainable technology, and sustainable social development, and stuff like that. But it's not becoming embedded in people's psyche and especially not in actions in everyday life. From the same peers or people I know, most of them are aware of it, but it does not translate into actions into their everyday life. So I don't' think it's embedded enough. (#18)

People do not take sustainable lifestyles seriously (23: +5) and sustainability is not made a priority in people's lives (32: +3). It might be 'fashionable' to be sustainable years ago, says participant #19, but unfortunately the current society regards those who adopt an eco-friendly lifestyle as the 'alternatives'. Participant #15 further adds that people prioritize money and luxury over sustainability. ''Sustainable living is just not the priority of this country. People are either interested in having a good time, or they are worried about paying the bills. There seems to be really few people into the environment'', says #15. Participant #18 argues that the lack of individual values for sustainability is the core problem:

> About social taboo and destructive consumption, that's kind of the social aspect of sustainable development, more about changing people's mind. Because I think the lack of value and changing people's mind- it has to come from within oneself. (#18)

Even if people are aware of environmental consequences, they are not necessarily motivated to contribute to the environment (20: +4). This indicates a huge gap between awareness and behaviors, says participant #15. ''There is a gap. Anyone who's done any research and look into this and I do it as well as part of my work. It's clear that there is a gap. In this country, it's not wide, if not wider than other countries- that's my opinion''.

For participant #18, the challenge for people to behave sustainably lies in their reluctance to change their habits. She uses the introduction of water charges in Ireland to demonstrate her point:

> People are aware of, very often, not all people, they are aware whether it's a sustainable thing to do, but they don't do it, because of...I guess it's hard to break a

> habit, or make a habit. So I don't think it's about unwillingness...maybe sometimes it's about unwillingness, well, but it's more about breaking a habit. So you know, if you are used to putting your rubbish in one bin, making the habit of recycling, it takes time. Coming back to the water charges, people probably know deep inside why they are being introduced, and they probably know it's the right thing to do, but still there are resistances. (#18)

Factor 3 regards the transition movements in Ireland only niches (33: -3). Public consultation process in environmental issues requires a lot of efforts (25: +1). Participant #18 points out that the challenges in public consultation process are because the general public cannot see past their little households for a broader picture of the benefits from sustainability. Any type of sustainability project requires a lot of consultation, communication, and appealing in the media to convince people. However, Factor 3 seems to imply that the lack of sustainable motivation and behavioural change is intrinsic, and has not so much to do with media (40: -1).

Factor 3 also regards the dominance of science and technology a negative impact on the sustainable development outlook. This factor does not think science and technology is the most effective means in achieving sustainable development (09: -2) despite various collaborations between the industry and the research institutions (50: -2). Participant #18 thinks that it is more effective for the academia to collaborate with the industry in small scale projects. ''I know in terms of the university and the industry can collaborate on the smaller scale, such as the green campus initiative, that is more effective,'' she says.

In addition, Factor 3 also points out that the Irish government is imposing science and technology on sustainable development policies (42: 0). Cleantech is not regarded highly in delivering green opportunities to Ireland (10: -2). However, there is agreement on the 'wicked' nature of sustainable development, which contributes to the difficulty of communicating effectively the concepts of sustainable development (07: +3) for different types of audiences (30: +5; 45: +4). Participant #9 says that communicating sustainability to various stakeholders is something that she comes across on a daily basis throughout her career. She communicates to both local government and small businesses. However, she feels that the core concepts of sustainable development have been dropped completely, since people are focusing on growth in the country:

> That's something I've dealt with, in various forms, on a daily basis throughout my career, and focusing on communicating sustainable development to both local government and small businesses. I feel that it has been dropped out from the agenda completely, whether everyone has heard about the word sustainable development, sustainability, and use it. But no one makes the connection what happens in their own life, and trying to sell it persuasively is not something in addition to what they do. It's very difficult at the moment, when people are focusing on particular the budgets, growth and economy. (#9)

Participant #13 points out that due to the abstract concepts in sustainability, it is very easy to lose the attention of some stakeholders if the communication messages are not particularly relevant to them:

> I think a lot of the sustainability concepts are very abstract, you know, and I think for everything that you are trying to communicate and it's relevant for that particular group of stakeholder. So if you have, just one-fit-all answer or communicating, you are going to lose, say, another 50% of the stakeholders because it's not relevant to them. So I suppose that's definitely a challenge. (#13)

Factor 3 also emphasizes on the connection between sustainable development theories and practices, in which they should be compatible and inform each other (36: -4). Participant #18 further points out that the general public does not engage in science and technology because they don't have the language or the knowledge to engage. She thinks that scientists and engineers should be able to communicate clearly to the general public. Participant #13 further adds that there is a lot of jargon and misinformation in the areas of communicating sustainable development:

> I do think that it's initially that people don't understand what sustainable development actually meant. There is a lot of jargon out there and also misunderstanding. I think everyone sort of knows something but there is no general consensus and there is a lot of misinformation out there as well. So I just think it needs to be put very simply, the language, so everyone knows about it. It's obviously quite ambitious to say that everyone should know about everything. (#13)

Factor 3 also suggests that sustainable development efforts should start from the individual levels (12: +1), and that communication strategies should target all, regardless of people's interests (54: -5). Those who are not interested are those who need the incentives and the push to subscribe to the sustainable development agenda, says participant #18:

> I'm always more into 'engage the disengaged'. So I think ones who subscribe to the sustainability agenda, I think, you are preaching to the choir. Of course it is, it is nice to have incentives for them as well. I think these people don't do it because of the incentives, they do it because they think it's the right thing to do. Whereas people who are not interested in sustainable development might need this initial incentive, push, to subscribe to the agenda. (#18)

Factor 3 also points out that stakeholders in the field of sustainable development should figure out new ways to communicate controversial scientific issues (55:+1). Similar to Factor 2, Factor 3 does not regard the impact of sustainable development policies and regulations exceeding individual incentives in driving environmental behaviours (24: -2, 43: -4). Participant #13 states that since the current society is a market-based one, incentives (whether social or economic ones) tend to be more effective than regulations. In addition, regulations are imposing, argues participant #18:

> Sometimes, oftentimes actually, sustainable development initiatives are more successful when they are more grassroots, and I know that by introducing something that's regulation driven, a bill, it covers a wider spectrum of people, but again, it's imposed rather than coming from the awareness that you have to do, that fits into sustainable development. So I think a lot of the grassroots and individual initiatives can actually be more effective, rather than imposing on people. (#18)

7.1.4 Factor 4: No consensus on solutions for multiple challenges; fatalistic outlook

Factor 4 has an eigenvalue of 1.18 and explains 10% of the study variance (see 6.1.4, Table 6.6). Five male participants are significantly associated with this factor. Three of them are from the public sustainability and environmental sector. Two of them are residents of the Cloughjordan Ecovillage.

Unlike other Factors where they think that there exists consensus among stakeholders in Ireland regarding sustainable development issues and solutions, Factor 4 points out that stakeholders have very different perspectives regarding the solutions and practices in sustainable development (03: +1). Participants sharing viewpoints in Factor 4 believe that Ireland is not prioritizing time for sustainable development (28: +4). Participant #11, who is from the public sector support of sustainability and environment, says that due to information overload, the Irish society is not giving priority to sustainable development issues:

> There just doesn't seem enough time with information overload. We don't have time to contemplate and cogitate on issues. So people react, they don't know the answer themselves, so they could only react, I think, what's been told to them. And that's not always the best way to organize the world. (#11)

Participant #16, also from the public environmental sector, adds that everyone is too busy and doesn't bother to think about where the society is going:

> We don't look at what's important in life, and this is important thing to do. I mean we look at sustainability, but sustainability is looking at the pathway that we are on, in terms of how this country is going to develop, but making the current pathway sustainable, it's not looking at the value system below it, and thinking about what our values are, what's actually important. And the reason is that literally everyone is too busy and don't have to step back and think about where society is going. So, like...the assumption is we know where society is going, and we have to get there in a sustainable manner, rather than standing back and just thinking what is really important, what we really have to do. And what makes people happy, as opposed to what makes people money. (#16)

Factor 4 also refers the challenges in sustainable development to the lack of participation from the general public in sustainable lifestyles (23: +5; 06: -4) and the huge gap between environmental awareness and real actions (20: +5). Participant #20, who is a resident of the Ecovillage in Cloughjordan, thinks that the lack of education regarding environmental consequences from unsustainability is the root of public's indifference to act sustainably:

> People aren't ashamed to litter on the streets, and that's on a simple level. There's a question of lack of education....because if people understand the consequences of their behaviours they might be more socially aware. (#20)

Another resident of the Ecovillage, participant #24, states that the society needs a fundamental change in the ethics of consumption, since there is an entirely lack of consciousness about unsustainable patterns of consumption in Ireland:

> I think consumerism is one of the greatest obstacles in sustainable development, and one of the huge challenges, to fundamentally change people's ethic in consumption, instead of consuming to satisfy our wants. We need to limit our consumptions to satisfy our needs. To put it simply, in Ireland there is an entirely lack of consciousness about that. (#24)

The sustainability outlook is not very optimistic due to adopting a growth model (47: +4), which participant #16 states is not a sensible solution:

> The getting back to growth one is...I mean, growth kind of got us into a massive problem in this country, but the only thing that's been looked at is our economy grew point is 5% last year and it's good news...Just talking about getting back to growth, unless it's the right kind of growth...it's not sensible. (#16)

Participants sharing viewpoints in Factor 4 also argue that economic success does not determine sustainable development success (51: -5). Participant #11 points out that the current society is adopting a compromised model to justify sacrificing the environmental aspect:

> And it's like what I've said, compromised model, whereas people are saying ''Well, in order to make this and that happen, we had to sacrifice the social criteria, we have to sacrifice the environmental criteria''. No, it [focusing on the economic dimension] kind of gives people a mechanism to be able to justify, an excuse. It explains it, but it shouldn't excuse it. (#11)

In addition, participant #16 argues that focusing on the economic dimension leads to the danger of discarding values in the society. ''I also think that focusing on the economic dimension in sustainable development, is, again, we actually took away the values in society

as important, because if you follow the economic dimension, you end up listening to the economists, '' he says.

For participant #24, he strongly disagrees with the premise that the economic dimension is as sustained as other dimensions:

> I think the complexity of achieving some form of development, or progress which is sustainable in the long run, requires far more than successfully achieve the economic dimension. I'm not even sure what successfully achieving the economic dimension means. I just refer to forms of consumption that is sustainable. Is that an economic dimension or is that a social dimension? I would look at it as a social dimension. The economic dimension I would understand as the production of goods and services. So that's one huge challenge. By no means if we were to resolve that...would sustainable development be achieved? It's impossible to conceptually treat an economic dimension as sustained from other dimensions. It is our sustainable patterns of consumption that drive it, our production pattern. (#24)

Factor 4 also argues that sustainable development should not be solely dependent on market shapers (41: -3). Participant #12 argues that market shapers will only focus on marketing purposes rather than a holistic approach in sustainability:

> Although the policy makers should not always be the leaders in the sustainability area, market shapers will only look at what the market is doing, and they won't try and lead it. And it's part of the problem with green marketing out there-it's from a market person to market it green, as opposed to someone who understands sustainability. (#12)

Participant #24 further adds that the market approach is failing the current society:

> I fundamentally disagree with that because I think market approaches try to achieve sustainability and they are failing us desperately...the market as we understand it...so we should not move the leadership from policy makers but towards policy makers and away from market shapers. So I fundamentally disagree with that. (#24)

However, participant #16 thinks that it might be effective to provide the market with incentives and encourage companies and industry to come up with more sustainable energy ideas:

> My position on climate change is that you set a carbon tax, and you make it that the carbon tax is going to be X amount, and it's going to be up from now to 2050, then you would have companies come up with...just let the market decide. But it's not saying that the market won't do it unless you have incentives. (#16)

Factor 4 teases out the viewpoint that the environmental and economic dimensions should be better connected in Ireland (44: -2) to integrate the three pillars in theory as well as in practice (36: -5). Participant #16 further states that the incompatibility in sustainable development dimensions in Ireland is due to the majority being fixated on the economic system.

Regarding science and technology being potential means to achieve sustainable development (09: +1), participant #12 points out that science and technology bring forth a lot of potential in sustainability efforts, such as energy reduction:

> I think that technology has gotten us into a lot of the mess that we are in, but I think the only way out is through technology. And there is a lot of game-changing technologies. I'm researching at the moment, there won't be just 1% or 2% energy reduction on the CO2 emission, it will be a 99% reduction. So it's a completely a game changer for different aspects of sustainability. (#12)

However, technological solutions might become over dominating in sustainable development discussions (08: +2). Debates around science and technology are also likely to result in public discords and people having polarized views regarding innovation (13: +2). Participant #20 points out that this is something that is inherent in human beings. People have strong opinions on either believing or not believing in technologies and innovations:

> I think people do tend to get very polarized and it's not just on green issues. I think it's just seems to be inherent into the beast of the humans. So people, some people will accept things without question, some people will accept things almost on a

> religious bases, whereas others would want to question more and want to give reasons to their choices. (#20)

Participant #24 also points out that people identify sustainable development within the techno-scientific frame, but rarely with social changes. He thinks there is a danger for discussions around sustainable development to remain merely marginal:

> It seems to me that sustainable development is broadly understood within a techno-scientific frame, rather than the challenges for social change. I think that's a weakness, and I refer not only to public debate but also to academic debate, the treatment of the subject- it's marginal, within the social sciences. (#24)

Regarding mobilizing the public in sustainable development, Factor 4 points out incentives such as easy-to-do, community activities are effective (15: +3). However, this factor also captures the viewpoint that the transition towards a low carbon footprint society takes tremendous efforts (49: +4). Sustainable development can't be easily achieved via merely creating individual incentives (35: +1), since individual engagement does not necessarily imply engagement on a collective level (12: -3). To achieve more public engagement in sustainable development, participant #16 thinks that the current Irish society should have more conversations about what a happy society really means. Participant #12 points out that sustainability needs to be incorporated into the curriculum to ensure public education in sustainable development:

> I think education on the public is crucial because there isn't enough education on the general public in the area of sustainable development. In particular there are a lot of green schools and that, but I think there needs to be a lot more done for people to go for the, the 3rd level education in particular. There is a lot of people getting into college but they know nothing about sustainability. (#12)

When it comes to stakeholder communication in sustainable development, Factor 4 regards dialogues and auditing the process of stakeholder communication important in tackling sustainable development challenges (01: +2; 05: +2). However, Factor 4 does not place too much emphasis on strategic approaches, such as communication proposition for stakeholders, translating complex concepts in sustainable development, or creating champions (30: -2; 45: -1; 46: -1). Despite agreement on creating sustainable development

initiatives for everyone, regardless of whether they are interested or not in sustainable development (54: -4), Factor 4 does not regard a model where experts and non-experts are treated equally in the decision making process ideal (52: -4).

Regarding creating incentives for people who are not interested in sustainable development, participant #11 uses examples from governmental grants to demonstrate that incentives will work for those interested as well as those uninterested. He strongly believes that by putting information out there, it creates positive feedback and triggers awareness. However, he talks about the danger of 'too much incentive' where changes in sustainability might become reactive rather than self-perpetuating:

> I think, you know, people, the incentives will always work and they will work in the same way for people who are interested and people who are not interested. So to say that it's not effective, it's wrong. In fact, these incentives, which are essentially costs. So if you look at the governmental grants, they used to have grants and that used to encourage people to do things. But really giving people information it's also a form of incentives, with less cost. And I think having made change, on having given incentives, you are creating change in that person's mind. You are creating positive feedback. I think what's important is, to stop the incentives, before they start to become, supports. It should be just encouraging someone to make a change, and that change should be self-perpetuating itself, not that people will say ''unless I get the support I'm not going to do anything''. (#11)

7.1.5 Factor 5: Strategic communication to enhance integrative approaches in sustainable development

Factor 5 has an eigenvalue of 1.14 and explains 10% of the study variance. Two males and two females are significantly associated with this factor (see 6.1.4, Table 6.6). Two male participants are from research institutions and the two female participants are from sustainable development consultancy agency. Factor 5 highly correlates with Factor 1, 2, 3, and 4. This implies that this factor shares overlapping concepts with the other four factors. However, from interpreting the post-sorting interviews, it is observed that factor 5 demonstrates somewhat a different outlook from the other five factors regarding the challenges and solutions around sustainable development in Ireland.

Factor 5 points out the lack of integrative approach in Ireland's sustainable development (02: +3). Participant #1, an engineer from a research institution, points out that despite the local authority's efforts in the integration of the three pillars in sustainable development, there are still a lot of people in Ireland who mainly focus on the environmental dimension when it comes to sustainable development:

> I know that the local authority has a very good sustainable development policy that does take into account the three pillars. A really nice one. But I can't say that the same thing is applicable to any other city councils. I also think that there is an awful lot of people who do not view sustainable development as anything more than the environment. (#1)

Participant #8, a sustainable development consultant, further adds that the societal dimension is often neglected in Ireland when it comes to sustainable development:

> Sustainable development, you see, tends to be talked about, firstly, in terms of economic terms. Environmental sustainability is placed secondly to that. You rarely heard sustainability talked about in terms of societal benefits. (#8)

The imbalanced model of sustainable development in Ireland is also evident in the growing disconnection between the environmental dimension and the economic one (44: +4). For example, participant #17, who is involved in various community-led sustainable development projects, argues that the majority of people in Ireland recognize sustainable development as only addressing environmental issues:

> The three [pillars in sustainable development] are very distant at the moment. When you mention sustainable development to people, a lot of people just think it's environment and they don't realize it's about the whole development. (#17)

Participants sharing this viewpoint also think that it is difficult to push the public consultation process regarding environmental bills in Ireland (25: +1). There are also public discords around scientific and technological debates, where people either accept or become suspicious of innovations (13: +2). Regarding the challenges in the public consultation process, participant #27, who is an engineer at a research institution, says that Ireland has a huge and sophisticated political process which leads to long public consultation process. ''In Ireland there is the political process which engage multiple agents and etc. Public

consultation requires many efforts because of the huge political social structure in this country,'' he says.

Regarding public debates around science and technology, participant #1 points out that these debates are often highly complicated since there are very few definitive answers in science and technology. For the general public, complicated discussions around science and technology are often too confusing and therefore results in distrusting the Irish government and scientists:

> It's a very difficult debate to have- science and technology. It is very difficult if you have people who say that well there is no proof...and it is very very difficult to have definitive answers. In science there are very few 100%...so it's very easy if you want to be at the centre to actually pick opposing views and pick some place to support. For the general public, it could simply be confusing and it could be....they just lose confidence in a lot of stuffs. (#1)

Factor 5 also captures the viewpoint that the sustainable development outlook should not be dependent on the managerial class in the Irish society (04: -3). Sustainable development theories and practices should inform and shape each other (36: -5). Participant #8 points out that theories around sustainable development have come into existence for a long time. People in Ireland should find time to sit down and discuss the practicalities, rather than ambiguous concepts of sustainability:

> I'm not sure if I'm in the position to say that they [sustainable development theories and practices] are not compatible. I just think that we haven't found ways that we can make them work together. I think while sustainable development has been around for a long time as a concept, I think now we are giving considerations to how we could make them work. (#8)

Participant #1 thinks that Ireland needs to establish centralized, integrated policies in sustainable development:

> I think we absolutely have to, and combine and integrate the three pillars. Otherwise we will never get to sustainability. There are so many things that have been done

> wrong. We need to build up policies- well the government talk about decentralizing policies...but I think we must integrate them. (#1)

For participant #17, the integration of sustainable development theories and practices implies the need for more stakeholder collaborations and cooperation:

> I think the three pillars can be done in practice. I think it's difficult, but because it's difficult doesn't mean it's impossible. I don't think it would be just in theory but not practice. I think sustainable development does work, in small ways. If you work together, and really see the future, it could actually work. (#17)

Unlike Factor 3, Factor 5 does not capture a huge gap between the general public's environmental awareness and behaviours (20: 0). However, participant #8 points out that even though the public does understand the basic concepts of sustainability, sustainable living is not made priority:

> I think people to some extent have an understanding of sustainability actions, such as recycling, renewable energies, things like that. I think even though they do understand, there are a lot of people who don't change their actions sustainably, in terms of consumption or practice. I think a lot of people who probably don't' take an interest towards sustainable living as a priority, and focus on the short-term of things.(#8)

Participants sharing the viewpoints in Factor 5 also argue that time should not be regarded as a limitation to solve sustainable development challenges (28: -4). For participant #1, the argument of time limitation in sustainable development is a bad justification for not putting sustainable development on the top agenda in Ireland, while participant #8 thinks that there are good opportunities for Ireland to re-evaluate the current sustainable development model:

> I don't think the problem is having not enough time. It is extremely important...the whole thing about sustainable development- it needs prioritizing, ranking on things that we must address, issues that we must address. And I think that people don't know what it is, there is a general misunderstanding of what sustainable

> development is...so this complexity...I don't think it is time, because time will be made for the most important things. (#1)

Unlike the fatalistic viewpoints captured in Factor 4, Factor 5 shows that there are positive examples in sustainable development efforts, such as transition movements (33:0). Participant #17 argues that Ireland's sustainable development is not hopeless, but rather there is still time to figure out solutions. ''I don't like the term that there is not enough time. I think there is enough time if you make it enough time. I understand that in one way we are running out of time, but we aren't doomed. There is time to sort things out'' she says.

Regarding the economic dimension in sustainable development, participants share similar viewpoints with those captured in Factor 1, 3, and 4, in which economic success does not determine sustainable development success in Ireland (51: -5). For example, participant #8 argues that Ireland should not give priority to economic growth. ''I think it is very likely that if we focus on economic sustainability in place first, it would be at the cost of the society and the environment. Certainly you have to take a balanced approach to these kinds of things,'' she says.

Participant #17 uses the failure of the Celtic Tiger to illustrate that driving sustainable development with the economic dimension would result in an unsustainable society. Therefore, communicating merely the economic benefits of sustainable development will not be ideal (34: -3):

> That's why there are the three aspects of sustainable development- it needs to be looked upon...and if we only looked at the economic dimension, we will get back to the Celtic Tiger days again while the other two aspects would fall through unsuccessfully. (#17)

Factor 5 proposes a strategic communication approach to enhance the integration of sustainable development dimensions. Concrete and persuasive communication strategies in sustainable development are essential (30: +4; 35: +1) to accommodate the agendas for a variety of target audiences (45: +4). For example, participant #8 thinks that communication around sustainable development in Ireland should focus more on marketing the benefits of sustainable development in improving the Irish society:

> I think there is a tendency, perhaps in perceptions as well, when people are talking about environmental issues, it's very, coming from very green and idealistic approach. And often that can be true. Selling is very much the key word, especially if we are not doing a very good job of selling these [sustainable development] ideas, of reasoning the benefits behind, of making changes. (#8)

Participant #17, on the other hand, argues that communicating sustainable development concepts should be concise and simple enough to appeal to everyone, and make them see how they could fit in in to achieve sustainability in Ireland:

> One of the biggest challenge for sustainable development is....there is a definition for it, but it's not strong enough, and people don't understand it, and have it into their day-to-day life. So it needs to be more concrete, and it needs a stronger elevator pitch. It needs to be able to tell it to everyone. And it makes sense if people can see they would fit into it and that it is important to a lot of people. (#17)

Factor 5 also captures the viewpoint that communication around sustainable development should be open, transparent, and inclusive of non-experts (38: +5). Participant #8 argues that there is a lot of knowledge among non-experts and it is essential to ensure the public's voice in decision-making regarding environmental policies. People would be more likely to change their unsustainable behaviours if they are engaged in decision-making:

> There is a lot of knowledge, a lot of passion, amongst non-experts, and there are tremendous results on anything for any kind of action that you want to achieve, getting people to buy in, to have some ownership of the decisions and policies they made. That's very important. And people would be more likely to make the changes. (#8)

Stakeholder dialogues (01: +2) and stakeholder collaborations (31: +5) also support policy making in wicked problems around sustainable development. However, participant #1 feels that sustainable development has been branded quite negatively in Ireland. She argues that more positive associations should be used in engaging the public in sustainable development:

> Wicked problems...the term is seem as bad, and so to engage more people into sustainable development it might be better to come up with something more

> positive. I'm afraid that sustainable development get branded with a lot of these wicked statements and we do need more engagement in the more positive way. (#1)

Successful stakeholder communication around sustainable development could help integrate the three pillars in sustainable development, says participant #17, ''there has to be collaboration, because sustainable development is the intersection of economic, environment, and society. The whole concept of sustainable development is holistic.''

Participant #27 further adds that adopting a bottom-up engagement model in communication around sustainable development guarantees more commitments. ''To get successes in development, people need to be committed. You need a bottom-up approach. You don't get commitments from a top-down approach. The way of getting inclusivity, transparency and etc.- it really does come to issues of commitment'' he says.

Regarding whether communication strategies around sustainable development are more effective by engaging those who are interested in sustainable development or those who are not interested, participants argue that it is important to create incentives for everyone (54: -4). For participant #1, communication strategies around sustainable development could be delivered in simple ways to generate effective results:

> I think it is effect to create incentives even for those who aren't interested in sustainable development because...even if they are not interested, it is something that everyone has to do. If you put in the incentives, then you would get the results, regardless of people who are interested or not. We don't even have to bring in the word of sustainability, we can actually teach people to do this...without having to teach them what sustainable development is or without having to bring up the complicated concept. Just use the very simple concept that you can teach them, so that it could actually be delivered. So I think it is effective to create incentives for everyone. (#1)

Participant #17 further argues that it would only make a bigger divide in society if incentives are only targeted at specific groups:

> I think you do have to incentivise those who are not interested in sustainable development because that's the whole point of education. Sometimes they just never heard of sustainable development or any related issues. So if you leave them

out, you are just creating greater divide, and it's a big divide at the moment, where there are lots of people who are less environmental. (#17)

7.1.6 Factor 6: the Cleantech and economic dimension should drive the sustainable development outlook, with regulatory, expert-driven approaches

Factor 6 has an eigenvalue of 1.06 and explains 5% of the study variance. The low study variance is due to having only one male participant significantly associated with this factor (see 6.1.4, Table 6.6). The male participant is a Cleantech business stakeholder in Dublin. Although it is common to discard a factor with only one participant, in this study it is retained for theoretical reasons (Brown 2001). First, this factor is considered important and included in the final selection of factor solutions since it has relatively low correlations with other factors (see discussions in 6.3). Secondly, the participant associated with this factor is the only green business stakeholder in this study among the 28 participants. Discarding this factor would lower the representation of the P (Participants) sample.

This participant holds a strong belief in the effectiveness of using economic drivers, innovations and Cleantech industries to lead the sustainable development outlook in Ireland. He is optimistic about the current sustainable development status in Ireland, where the general public has equal opportunities to access information regarding sustainable development and engage (26: -4). People's awareness of sustainable development and sustainable behaviors in Ireland is adequate (06: 0). ''There's plenty of it [awareness] present here around sustainable development in Ireland. In fact, there is too much. There is far too much social transparency and social equity being presented in the sustainable development agenda in Ireland'' he says.

Factor 6 shows that there are collective transition movements in Ireland (33: 0) and there are common values in adopting sustainable lifestyles (23: 0). On the policy level, Ireland's national sustainable development strategies are satisfactory. Regarding integrating the three pillars in sustainable development, this factor captures the perspective that Ireland already has an integrative approach in sustainable development and the pillars demonstrate compatibility with each other (36: +2; 02: -5). However, participant #3 argues that Ireland should put more emphasis on the economic one to motivate behavioral change:

> I think we have an overly holistic view of the three pillars. To go back on my earliest point, if the emphasis is put on the economic pillar, the other two would benefit. If the emphasis is put on the environmental, the society pillar, there will be no incentives for corporations to change their behaviours because there will be nothing for them. (#3)

He argues that it is more effective to mobilize and communicate to the majority of people in ireland with economic benefits (14: +4). Economic benefits delivered by sustainable development are easier for people to comprehend and respond to than the complexities of science and innovations (34: +3). For example, participant #3 points out that Ireland should generate the right economic incentives to create interests for those who haven't yet responded to sustainable development (54: -4):

> Well I think the incentives create the interest, so companies out there who aren't currently making changes would rapidly respond to the appropriate incentives. And therefore we shouldn't be just focusing, or preaching to the converted, or focusing on people who already get this [sustainable development]. We should be focusing on people who may get it philosophically but have no incentives to change their behaviours economically. (#3)

He also points out despite initial resistance to new environmental policies and regulations, people would eventually change their behaviors once the initiatives and projects are already in place. He uses examples such as property charges, plastic bag levy and recycling to demonstrate his argument:

> The Irish do not like new things, whether that be regulatory, changes in behaviour, modification, and how they go about in their daily lives. This sustainable development agenda has to modify and calibrate an awful lot of behaviours in our lives, whether leaving the taps on so the water pipes start unfreeze, or how you treat your waste. Well, we don't like change and that's human nature. In fairness we are fairly quick to get on with it once the change has been in enacted, and it doesn't look like anybody is growing back on it. So as soon as the property charge came in, there was a huge campaign in against it. As soon as it became embedded, everyone just gets on with it. It will happen with water. The same happened with recycling waste. It's a question of just getting on with things and allowing people moments of their

> frustration when they realized that they have to change. But once they realized they have to, they come to the realization and their behaviours start to change radically. If you look at the amount of wastes going to green bins in Dublin, compared to, when they were first introduced, there has been a huge success. Same with the plastic bag tax. It's going to be the same with water. (#3)

Science and technology are used in Ireland as an instrumental tool to support sustainable development policies (42: 0). However, unlike the concerns pointed out by participant #24 in Factor 4, Factor 6 shows that the emphasis on the science paradigm does not lead to marginal discussions of the societal dimensions in sustainable development (08: -3).

Factor 6 therefore teases out the importance of Cleantech opportunities in Ireland, and the potentials of Irish organizations and corporations driving sustainability agenda in their business operations (10: +5; 11: -1; 39: +3). Participant #3 points out that innovation and clean technologies will deliver opportunities to various sectors in Ireland, such as food, communication, transport and etc. By facilitating and incentivizing developments in Cleantech it would bring forth economic booms to this country:

> I'm just a firm believer that innovation and clean technologies is going to bring a lot of opportunities to Ireland and various different sectors to food to generation, communication, transport and everything else. I think it is a very big opportunity for Ireland due to the fact that we already have an indigenous and multi-based community operating in the software space. We have a big agriculture industry...and I think there is a huge scope for opportunities and innovations in those areas. And I think everything that could be done to facilitate and incentivized the developments of Cleantech is actually going to be booms to this country, in terms of economically ones, but also tackling the various challenges we have across climate change and resource efficiencies. (#3)

In additional, Factor 6 emphasizes an open-market approach in Ireland's sustainable development (41: +2). This factor also supports using economic growth as an indicator for measuring the success of environmental policies (29: -2). For example, participant #3 points out that once economic development is achieved, the other two dimensions (environmental, societal) would be easily achieved as well (47: -4; 51: +4). He doesn't think that the environmental and societal dimensions of sustainable development in Ireland would fall back

while the society pursuits growth. Rather, he suggests that a new type of growth model should be developed, such as using innovation to drive sustainability:

> I think it's not a contradiction to focus on sustainability and growth at the same time. We should be getting back to growth, but in a sustainable fashion, and using innovation to drive that growth. I think we definitely need a new type of growth than we had before, but I don't think sustainability has to fall back while we pursue growth. (#3)

Similar to Factor 1, this factor also regards regulatory approaches more effective in driving Ireland's sustainable development (43: +5) than focusing on individual drivers such as human relationships with the nature (18: -3). Factor 6 also views individual and community-led incentives not as effective in engaging people to participate in sustainable development (15: 0; 17: -2). Participant #3 states that behavioural changes only occur with top-down regulations, and that consumer-driven 'carrots' are not as effective as government regulations:

> I absolutely believe it [top-down approach] would be more effective. From the plastic bag to the impending rivalry of Irish water- it's only when the regulation come from the top-down are behavioural changes affected. I guarantee that once Irish water start charging, Irish consumers' proper cost of economic water, usage of that resource, will be radically altered. That could never be incentivized through a marketing campaign; only through government regulation, tax. Whether it is water, whether it is waste management, whether it is carbon emissions, I think the regulatory 'stick' is going to be far more important than the consumer-driven 'carrot'. (#3)

Factor 6 does not consider inclusive communication in sustainable development ideal, which treats experts and non-experts equally important (21: -2; 38: -2; 52: -5). Participant #3 argues that adopting such communication model would result in interest groups, lobby groups and professional protesters making a lot of noises, and thus impede development projects and policies based on very narrow grounds. He thinks that the sustainable development agenda in Ireland should be fact-based, evidence-based, scientifically-led and government-led:

> I strongly disagree that citizen needs a stronger or louder voice. I think the problem with that is that voices get hijacked by interest groups and lobby groups and professional protesters and cranks who can make a lot of noise and hold back projects and activities and policies on very narrow grounds that ruins country to the overall public interests. So I don't think this agenda should be about bringing everyone along. The agenda should be a fact-based, evidence-based, scientifically-led dictate that this is what the problem is, this is what the solutions are. We are going to implement those, we are going to go through public consultation on this with respect on how it would affect you, but you do not have a meta level on the stuff. So I would strongly disagree that citizens should have a stronger voice on this agenda. I think it should be government-led. (#3)

Regarding communication challenges around sustainable development in Ireland, this factor shows the viewpoint that the Irish government is not communicating clearly the most important issues in sustainable development (37: +3). In addition, it is challenging to come up with persuasive propositions for various stakeholders to actively engage with sustainable development in Ireland (30: +4). Participant #3 points out that there exists a generation gap in understanding sustainable development in Ireland, where young generations are becoming more aware of the tangible meanings in sustainable development, while the current generation is still 'locked-in'. He thinks that Ireland should encourage more examples in sustainable development to demonstrate the monetary effects delivered by these projects:

> I do think that it is a big challenge to make sustainable development tangible to people. Explaining why it's a central part of their life. I think it is a generational thing. I think that our kids have already grasped it, um, won't misunderstood it in a way that we do...the current generation is struggling to understand sustainable development and its tangible meanings from their perspectives. So if there were more stories, if there were more monetary effects on their parts, that they could understand and roll in behind and use it, use those stories to explain to themselves, I think the acceptance would be much higher and much more successful. (#3)

Unlike Factor 2 and Factor 5, Factor 6 does not regard stakeholder communication and dialogues the most effective solutions for sustainable development in Ireland (01: -1; 05: -2).

Stakeholders have mutual understanding of the objectives in Ireland's sustainable development (03: -2). New communication protocols in complex issues such as sustainable development are not necessary (55: -3).

7.2 Discussions on the six types of perspectives

This section discusses each of the six types of perspectives, including their characteristics and implications, as well as comparisons with other perspectives.

To make each perspective more distinctive, each perspective is attached with a short descriptive title, fine-tuned from the descriptions in the previous section (7.1) to capture the core essence of that particular perspective. In addition, it is emphasized in this study that the following perspectives are participants' perspectives and not stakeholder typologies, since the factors in a Q methodology study capture distinctive perspectives rather than stakeholder types (Watts & Stenner 2012).

7.2.1 Type 1 Perspective: Environmentalism with new regulatory regime

Type 1 perspective captures the necessity for more robust environmental policies and regulations in Ireland. This is very similar to Kelly et al.'s (2007, p.16) study where the findings show that there is a lack of rigorous implementation of environmental policies, and that the state is responsible for the structure, formulation and implementation of environmental policies:

> It is the role of the state to formulate the overall direction of environmental policy and in particular its relationship to economic interests and the direction of the economy as a whole, to establish departmental and cross-departmental structures that facilitate the formulation and implementation of environmental policies, to ensure that local authorities are adequately resourced to fulfil their environmental obligations, as well as to establish the legal and organisational framework which facilitates participatory, deliberative and inclusive decision making.

Participants sharing Type 1 perspective are dubious regarding the current outlook of sustainable development in Ireland due to the prioritization of the growth model in the country leading to business-as-usual. Type 1 perspective shows that such business-as-usual

approaches are unsustainable and that more radical changes in the political system are needed to ensure sustainable development.

This perspective also responds to the collective unsustainable outcomes of the Irish society, with the majority indifferent to sustainable lifestyles and changing consumption patterns. Type 1 perspective proposes rewriting environmental policy-making and regulatory changes on the national scale as well as responding to international sustainable development plans. Participants call for government-led, systemic solutions to tackle the complex issues around sustainable development in Ireland. This is quite similar to Kelly et al.'s (2007) study where the findings show that the Irish are supportive of state solutions, such as higher taxes and prices associated with environmental regulations. In addition, Type 1 perspective is similar to what Curry et al. (2012) describe as 'administrative rationalism' pointed out by Dryzek (2005), which ''accords a leading (indeed dominant) role and responsibility to the state in dealing with and devising solutions to the challenge of the transition towards sustainability, and is not averse to the state using its legitimate coercive power to enable that transition'' (ibid, p.18). However, participants in our Q methodology study did not provide specific examples to what the state environmental solutions or regulations should entail. This shows that participants in this study are not certain what to expect from a new regulatory regime associated with environmentalism, even though they point out the urgency for the political system to change radically. Drafting up a set of concrete solutions for sustainable development is challenging and requires further deliberation than within the scope of this study.

Participants who strongly associate with this perspective are likely to work closely with policy makers to inject changes in the regulatory framework, or appeal to cross-national collaborations and negotiations. This is similar to one of the discourses teased out in Curry et al.'s (2012) study, where mitigating unsustainability is ''in terms of large-scale 'systemic' and 'infrastructural' changes'' (ibid., p.21). However, since a systemic change requires tremendous time to see the effects, it generates uncertainties. For example, Hopwood et al. (2005, p.50) argue that a more subtle approach is more appropriate in sustainable development since transformation may not be immediately feasible. Barry (2007) also argues that it is only possible to create a sustainable economy from existing structures, laws, regulations, and etc. It is impossible to switch over to an alternative economy without receiving recognition from most people in a democratic manner (ibid.). For example, past

failures in international efforts in sustainable development such as Agenda 21 in 2002 demonstrate huge challenges in cross-national efforts in sustainable development (Wyplosz 2010).

In addition to policies and regulations, cost-effective incentives in sustainable development might appeal more to people, especially the industries. From the post-sorting interviews, several participants also mention that they would prefer Ireland to have a mix-and-match approach in sustainable development, integrating bottom-up incentives as well as top-down regulations. For example, Jackson (2005) points out that policy could renegotiate existing unsustainable habits. In motivating pro-environmental attitudes, it is possible to trigger behavioral change without necessarily changing attitudes. For example, people might react to municipal's new waste collection services to recycle.

To sum up, Type 1 perspective shows that Ireland should address environmentalism with a new regulatory regime. Participants sharing this perspective are pessimistic regarding the current business-as-usual model in sustainable development in Ireland. The main solutions proposed by this perspective are systemic changes and state regulations to ensure the success of sustainable development.

7.2.2 Type 2 perspective: Postmaterialism and egalitarianism

Type 2 perspective captures a post-materialistic and egalitarian viewpoint, in which the emphasis is placed on the empowerment of various stakeholders in open and inclusive stakeholder dialogues around sustainable development issues. The optimistic outlook captured in this perspective is built on the premise that environmentalism in Ireland is becoming a mainstream paradigm (Kelly et al. 2007).

Type 2 perspective focuses on interactions between multidisciplinary stakeholders, rather than the call for political and regulatory imperatives captured in Type 1 perspective. From the quantitative analysis, the correlation between Type 1 and Type 2 perspective (Factor 1 & Factor 2 arrays) is relatively low (0.29) (see 5.1.5, Table 5.9). This indicates that Type 1 and Type 2 perspectives are distinctive from each other and are less likely to manifestate around similar viewpoints.

Regarding the implications of communication among Type 1 and Type 2 perspectives, the low correlation between the two factor arrays also imply challenges in reaching consensus among participants who associate strongly with Type 1 perspective and those with Type 2, as they regard very differently the core problems and solutions around sustainable development in Ireland. For example, participants sharing Type 2 perspective regard empowerment and engagement of all stakeholder the keys to a bottom-up, inclusive communication approach, including non-experts. This is very different from Type 1 perspective which denies the non-experts, inclusive communication model in sustainable development. In addition, Type 2 perspective features communication between experts and decision makers being dynamic and collaborative. From the post-sorting interviews, participants associated to this perspective point out that communication is not effective if stakeholders from the experts or decision- making communities feel excluded from dialogues. The call for an egalitarian communication model signals participants' rejections of society's unequal and injustice political structures, and that environmental empowerment would be an enable for pro-environmental behaviours (Kelly et al. 2007).

The inclusive communication model proposed in this perspective responds to Roberts' (2000) discussions around problem solving by experts- if problem solving is left to experts only, the public would become very detached from the important issues in the society and it might lead to their lack of engagement in governing environmental issues. In Type 2 perspective, multi-disciplinary and cross-sector collaboration are the core solutions to sustainable development issues in Ireland. The notions of knowledge transfer (Sneddon et al. 2006) and knowledge capacity building (Ahmed & Stein 2004) is highly reflected in this perspective.

Type 2 perspective also calls for more individual contributions in sustainable development in Ireland. The emphasis on individual behaviors in environment is similar to one of the discourses captured in Barry & Proops' (1999) Q methodology study on sustainability dimensions, in which their fourth discourse illustrates that individual actions are accounted for the achievement of environmental improvements. However, sustainable development model based on individual motivations alone could be insufficient in addressing the complex social factors leading to pro-environmental behavior change. Environmental policy mechanisms need more sophisticated and pluralistic approaches (Jackson 2005). On the other hand, the complex problems in the political structures of sustainable development in Ireland is more recognized in the previous perspective, the Type 1 perspective, since it

attempts to tackle issues such as inequality, and the unsustainable economic system in Ireland.

Stakeholders who strongly associate with Type 2 perspective are most likely to be activists in sustainable development in Ireland. They are optimistic about the current sustainable development outlook in Ireland and believe that given the right approaches, stakeholders from all disciplines would get involved to achieve sustainable development. The emphasis on an inclusive communication perhaps also signals out issues related to overly centralised power and democratic deficit in Ireland's environmental decision making.

However, this perspective neglects to see the challenges in motivating and incentivising non-activists. For example, there is a danger of assuming that every type of stakeholders would want to be engaged in sustainable development, whereas those who are holding quite pessimistic outlook for sustainable development in Ireland (see Type 4 perspective) might not be interested in communicating and collaborating with others.

To sum up, Type 2 perspective focuses on multidisciplinary collaboration, capturing the key concepts of effective stakeholder communication from the literature (see 2.3.3). Participants who associate with this perspective are advocates of inclusive and open stakeholder dialogues. Type 2 perspective argues for more collaboration among a wide range of disciplines. The learning process and knowledge exchange among stakeholders involved in sustainable development are considered essential.

7.2.3 Type 3 perspective: Environmental efficacy with public mobilization

Type 3 perspective focuses on the public's lack of environmental behaviors as the major obstacle in achieving sustainable development in Ireland. This responds to a series of survey studies showing that there are very few Irish people actively engaged in environmental issues (Kelly et al. 2007). Type 3 perspective calls for a solution to increase environmental efficacy through public mobilization. This proposed solution is very different from the focus on addressing the failures in the political systems around sustainable development in Ireland with new regulatory regime, which is captured in Type 1 perspective. The solution proposed by Type 3 perspective is also different from the focus on the need for more egalitarian and open processes in stakeholder communication captured by Type 2 perspective. Compared to Type 2 perspective, participants associated with Type 3 perspective are rather pessimistic

since they assume that the general public in Ireland is indifferent to sustainability issues. However, there is strong consensus among those who share Type 3 perspective and those who share Type 2 perspective, in which bottom-up approaches in sustainable development would be more effective than policies and regulations proposed by Type 1 perspective.

Type 3 perspective regards education in sustainable development as one of the imperatives to mobilize the public, indicating that concerns and commitments towards the environment is greater among those with more knowledge regarding environmental issues (Kelly et al. 2007). However, distrusts for authority figures, institutions and businesses are not captured in this perspective, indicating that the low level of environmental efficacy among the public is somewhat more intrinsic in individualistic. The general public regards urgent problems more important than wicked problems in the environment. For example, the majority worry about their next paycheck and how the economy in Ireland influence housing prices, but not how global warming impact Ireland.

Despite consensus on mobilizing the public as the most appropriate solution in achieving sustainable development in Ireland, participants associated with Type 3 perspective did not mention which specific types of public incentives would be most effective, or the consequences of unsuccessful incentives. Similar with participants associated with Type 1 perspective, participants here are not certain what to do to increase higher environmental efficacy through individual incentives. Perhaps resorting to the interdependence among humans and the natural world would be solution, signalled out by Kelly et al. (2007; p.17):

> In what may increasingly become an economically rich but morally barren and highly individualised society, the importance of encouraging a recognition of the centrality of the natural world and human interdependence with it, and an integration of this perspective into one's personal sense of space and place, may be key to taking responsibility for the kind of society created both nationally and globally.

However, there is also a danger of assuming that once the public is aware and engaging in sustainability, Ireland would achieve sustainable development. The literaturepoints out in practice, there are difficulties and dilemmas in public engagement and empowerment process around sustainable development. Successful public participation does not guarantee successful solutions to complex problems (Cuppen et al. 2010).

To sum up, Type 3 perspective focus on 'Public Mobilization'. Participants sharing this perspective regard public indifference in sustainability issues as the core problem in sustainable development in Ireland. Participants associated with this perspective are concerned about the lack of public engagement in sustainability and call for ground-level incentives.

7.2.4 Type 4 perspective: Fatalism in sustainable development

Type 4 perspective is somewhat fatalistic compared to the other five types of perspectives. Unlike the other five perspectives, there is no consensus on the specific challenges and approaches around sustainable development in Ireland. This perspective responds to literature pointing out the human incapability of tackling global issues, given limited time (Levin et al.'s 2009).

Participants associated strongly with this perspective are familiar with discourses around sustainable development and they are knowledgeable regarding the pros and cons of different approaches and solutions. The dissensus on most appropriate solutions to achieve sustainable development in Ireland responds to Kelly et al.'s (2007) study where findings shows that the Irish people attach very different meanings to understanding environment.

Participants sharing this perspective are quite pessimistic about the current sustainable development outlook in Ireland. There have been a lot of talks about sustainability in Ireland, but unfortunately not a lot of actions. The Irish public is still 'switched-off' about sustainability. The storms and extreme weather conditions in Ireland might have triggered more awareness among the public regarding the environment, but usually public's awareness regarding sustainability decline after a period of time. Participants sharing this perspective consider the future unknown and unpredictable for Ireland. Eventually people would have to 're-engineer' the political, social and economic systems to adapt to environmental consequences. However, Ireland is not yet at the 'tipping point', so there's no strong evidence of a systemic change at the moment. Similar to Type 1 perspective, Type 4 perspective also responds to, perhaps even more strongly, the notion of 'wicked' problems in sustainable development. However, Type 4 perspective seems to address particularly the inability of all possible solutions in sustainable development.

To sum up, Type 4 perspective is a fatalistic one and focus on debates and discussions around the challenges and solutions in sustainable development. Participants associated with this perspective are knowledgeable regarding the pros and cons of various sustainable development approaches. However, they do not consider any particular approach effective in addressing sustainable development issues. The notion of time limitation and Ireland's vulnerability to compete with time is also captures in this perspective, showing a despair outlook for sustainable development in Ireland.

7.2.5 Type 5 perspective: Strategic Communication

Participants sharing Type 5 perspective call for a strategic, communication approach. It corresponds to the drawbacks of compartmentalization of disciplines leading to low quality communication (Carley & Christie 1992) and that strategic communication provides an instrumental approach for effective policy making and public participation. Type 5 perspective also best describes Futerra Sustainability Communications' (2005) statement that communication strategies not only have the power to inform but also to inspire and achieve long-term change.

Participants associated with Type 5 perspective are advocates of the integration of the three pillars in sustainable development. The intersection of theory and application in wicked problems is also deemed essential. Type 5 perspective is also quite optimistic. For example, during the stakeholder feedback discussion, participant #28 argues that he is rather optimistic about the sustainable development outlook in Ireland and points out that strategic approaches would bring opportunities such as effective political incentives and good regulations. Participant #14 says that he has a much more optimistic approach than participants who associate with Type 4 perspective.

However, it is rather obscure from the analysis whether this perspective calls for a top-down or bottom-up communication approach. From the quantitative analysis, the factor correlations show that factor 5 is highly correlated with factor 1, 2, 3 and 4 (0.50; 0.51; 0.60; 0.47). This implies that participants sharing this perspective possibly have the characteristics of communication coordinators, and that that regard communication strategies in sustainable development as a collage of initiatives rather than single, stand-alone planning.

Participants sharing Type 5 perspective focus mainly on ensuring holism of sustainable development rather than having a particular stance on sustainable development approaches. On the other hand, the strong associations of this perspective with other three perspectives indicate that the participants recognize the importance of stakeholder communication in different sustainable development approaches. However, there are also uncertainties in whether adopting an integrative approach would be applicable. For example, in economic analysis, evaluating non-market impacts is challenging due to the fact that values are heterogeneous and subject to controversies (IPCC 2013, Chapter 17).

One of the downsides of this perspective could be that it focuses more on the communicative and strategic approach, but neglects to provide concrete and effective solutions and steps to achieve sustainable development goals. Back in 1997, Cooper already pointed out that communication around sustainable development needs a framework to identify positions of different stakeholder groups. Cuppen et al. (2010) also argue that stakeholder dialogues need to be more structured in teasing out complex environmental issues. The notion of 'effective communication' is therefore crucial (Swindall 2000), since the fuzziness of communication, for example using the same words to express different ideas might lead to misunderstanding (Cooper 1997). Unfortunately, discussions around these topics are absent among participants sharing Type 5 perspective.

To sum up, Type 5 perspective focuses on strategic communication. Participants sharing this perspective call for a strategic communication approach to ensure the integrity of the three pillars in sustainable development. They believe in a coordinated approach and support stakeholder collaborations.

7.2.6 Type 6 perspective: Technocratic Solutions

From the factor analysis result, there is only one participant holding this perspective. However, this is a perspective well represented in the discourses around sustainable development (see 2.3.3), and not a marginal perspective. It captures the technocratic perspective on sustainable development, that science and technology are amongst the most effective solutions to sustainable development problems. Although there is only one participant associated strongly with this perspective, we decided to include this perspective in the analysis, since the Q methodology analysis aims to extract 'distinctive' viewpoints over

'dominant' viewpoints. In other words, selecting a factor in the final analysis based on the number of participants associating with that particular factor would be inappropriate. From the quantitative analysis, Factor 6 has an eigenvalue of 1.06 - which is valid for factor extraction, and in the meantime has low correlations with the other five factors (see Table 6.9) - the above imply that Factor 6 generates a significantly different perspective than the other five factors. As a result, we've included this Factor in the final analysis.

However, it would be unfair to assume that participants sharing this perspective are advocates of the 'business-as-usual' model. Rather, they are more likely to argue for a new type of growth model, one that focuses on promoting a green economy (GCII 2012). This perspective supports Cleantech driving the competitiveness of a nation rather than conventional technologies (Cooke 2008), which responds to Van Passel's (2008) claim that Cleantech is an essential step towards achieving a stronger sustainability. In Curry et al.'s (2012) Q methodology study on *stakeholder views on the environmental and resource dimensions of sustainability*, they also capture a discourse (discourse 2) which supports sustainability through business and technology.

From the stakeholder feedback, many argue that this perspective might be shared largely not only by the green business sector but also the finance sector. This is due to the fact that the key aspects in this perspective revolve around products and services as well as market benefits and consumers.

However, participant #1 further points out that this perspective is merely a 'silver bullet' approach, which will not solve climate change issues. Participant #13, who supports Type 6 perspective and recognizes several similarities between perspective Type 5 and Type 6, also points out the risks and dangers of neglecting the societal and cultural element. Therefore she points out the necessity for having a 'back-up' plan.

One of the critiques received by Type 6 perspective would be that it is very much a positivist one. In their Q methodology study, Curry et al. (2012) points out that their second discourse presents the notion of 'technological optimism' and highlights the conflicts between business and government. However, in our Q methodology study, Type 6 perspective does not capture the conflicts between business and government.

On the other hand, Kelly et al. (2007, p.13) discusses the public's mistrusts in scientific domination driven by shared interests among businesses and political elites:

> They [the Irish public] drew on a deeply held sense that this [scientific] domination was maintained in the interest of an alliance of business and political elites, which used scientific knowledge in its own interest. Trust in this alliance was low, and science coming from this source was likewise seen as tainted. The independence of scientists was questioned, and there was a perception that science was being used as a smokescreen by the powerful to hide their particularistic economic and political interests.

The notion of neoclassical approach of technological optimism reflects the weak sustainability paradigm (Neumayer 2003; van Passel 2008). It holds the belief that man-made capital or technical progress could replace natural resources. In one of the sustainability discourses extracted from their Q methodology study, technology is perceived as a progress (Barry & Proops 1999). However, the discourse does not agree that technology would solve all environmental problems, whereas in this study technological solutions are highly favoured as an approach to achieve ecological modernisation. However, there is a danger of assuming that "capitalism can accommodate the environmental challenge" (Gouldson & Murphy, 1998, p.75). Pepper (1998, p.3) also points out that there are cases where environmentally harmful activities have been allocated to newly industrialized and less developed countries to create environmental improvements in developed regions. To fully embrace the techno-optimism and ecological modernisation, we need to ensure that economic growth and environmental protection are mutually supportive on policy levels.

In this study, analysis shows that the conflicts between Type 6 perspective and other types of perspectives are mainly revolving around the notions of 'economic growth'. This implies that some participants in our study deem the economical dimension incompatible with sustaining other two dimensions in sustainable development.

From the quantitative analysis, the correlations between Type 6 perspective and other 5 perspectives are relatively lower than the correlations among Type 1- Type 5 perspectives. This implies a higher threshold for stakeholder communication and collaboration among stakeholders who associate with Type 6 perspective and those who associate with the others. As a result, it is easier to observe participants associated with Type 6 perspective

forming a singular cluster (i.e *The Green Way*). This also responds to Cuppen et al.'s (2010) observation in their study that some sectors are more diverse than others while some perspectives are shared by particular sectors.

To sum up, Type 6 perspective has little overlaps with the other five perspectives captured in this study. It focuses on technocratic solutions, which promote the development of Cleantech and innovations. Participants associated with this perspective also place a strong emphasis on economic growth.

7.3 Discussions on the analysis

This section discusses the overall results from the Q methodology study, with the six-factor solution. The following subsections examine: how are the six perspectives shared among a range of participants? What are the similarities and differences among these six perspectives? How do participants from the feedback discussions regard the representativeness of these six perspectives? What are the opportunities and challenges in stakeholder communication among these six types of perspectives?

7.3.1 How are the six perspectives shared among a range of participants?

Before running the factor analysis, we predicted the outcome to present a 'sectoral' perspective. In other words, we expected that participants from the local government would associate themselves with the same perspectives, while those from NGOs would share another one. However, the final analysis shows otherwise. The results demonstrate shared perspectives across sectors, indicating that the associations between sectors and perspectives are not very significant. This observation, however, is not new in Q methodology studies. In a Q methodology study to select participants for a stakeholder dialogue on energy options from biomass in the Netherland, Cuppen et al. (2010) also discover the heterogeneity of sector types in terms of perspectives. In other words, Cuppen et al. argue that the composition of perspectives from the Q methodology results generate stakeholder groups which the participants identify with, instead of associating with sectoral types. Cuppen et al.'s study (ibid.) demonstrates that the traditional notion of 'sectors' might not provide authentic representations in sustainability related perspectives. In the following paragraphs, we will further discuss several possible implications to the insignificant representation of sectors in our Q methodology study results:

First, the insignificant representation of sectors in our study results might imply that there are huge potentials in stakeholder collaborations in sustainable development in Ireland. Since sustainable development is 'wicked', a mixture of perspectives within the same sectors might be fruitful in facilitating more possibilities. The different perspectives from the factor analysis are also very likely to be reflected in stakeholder dialogues (Cuppen et al. 2010). The potentials in stakeholder collaboration responds to assertions from Type 2 perspective, who argues that interactions among various stakeholders could strengthen collaborations and

knowledge capacity in problem solving. Integrative knowledge in cross-disciplinary fields also indicates successful stakeholder collaborations (Carley & Christie 1992, p.174; Macnaghten et al. 2005). In addition, stakeholder participation in multidisciplinary dialogues help facilitate political changes (Meppem & Gill 1998).

On the other hand, having stakeholders from cross-sectors sharing the same perspectives in this study might also illustrate the fragmentation of sustainable development approaches in various Irish sectors. In addition, the fragmentation of sustainable development approaches might imply Irish government's lack of recognition for more unique characteristics and perspectives of stakeholders, as well as the decentralization of organizations dues to complexity in sustainable development. The lack of centralized approaches in sustainable development in Ireland and the compartmentalization of disciplines within organizations might hinder stakeholder communication (Carley & Christie 1992).

Third, the lack of 'sectoral' perspective in this study might indicate that perspectives captured in issues around sustainable development are quite individual instead of collective. In other words, the six perspectives captured in this study might illustrate individual perspectives more accurately but do not reflect the participants' organizational viewpoint. During the stakeholder feedback discussions, several participants also reveal the fact that they associate with multiple perspectives. For example, participant #1 points out that personally, she associates most strongly with Type 1 perspective , that there is an urgent need for more regulatory structures in Ireland's sustainable development. However, she says that in her practice (engineer and educator at a research institution), she is exercising approaches proposed by Type 3 perspective, which aims to educate and mobilize people the core values regarding sustainable development. Another participant, participant #2, who is a 'confounder' (meaning that the participant associates with more than one factor), argues that perspectives around sustainable development should be mixed rather than distinctive.

To sum up, even though our Q methodology study extracts six types of perspectives regarding communication around sustainable development in Ireland, and that these perspectives are distinctive from one another, in reality and practice, it is highly likely for participants to associate and identify themselves across multiple perspectives.

7.3.2 What are the similarities and differences among these six perspectives around sustainable development challenges and solutions in Ireland?

In this subsection, we aim to investigate the similarities and differences across the six types of perspectives around sustainable development challenges and approaches in Ireland. From the quantitative results, the correlations between the six factors are significant (see Chapter 6, section 6.1.5), indicating that different perspectives might overlap and manifest around similar viewpoints. From the full interpretation of the six factors, we observe three major challenges and solutions around sustainable development in Ireland: political economy challenges, procedural challenges, and social challenges.

Regarding the political economy challenges in Ireland, from the analysis in this study, it is clear that both Type 1 and Type 6 perspectives address failures in the current Irish growth and business-as-usual model. Type 1 perspective calls for a systemic change. This is very similar to Hopwood et al.'s (2005) 'reformists' perspective, where system adaptations are required to achieve sustainable development. For example, one of the actions in the 'reform' perspective is persuading governments and international organizations to introduce radical shifts in policies and lifestyles. In addition, since the fundamental issues are the very economic and political, ''a radical transformation is needed'' (ibid, p.42). On the other hand, Type 6 perspective takes on the green economy approach and call for technological solutions to mitigate environmental issues as well as providing social and economic benefits. Both Type 1 and Type 6 perspectives acknowledge the challenges in the substantial shifts of expectations for a new political economy to replace the current structures in the Irish society.

Both Type 1 and Type 6 perspectives' proposed solutions respond to Ireland being a latecomer to debates and political solutions around sustainability. The proposed solutions by Type 1 and Type 6 perspectives regarding the political economy in Ireland imply that sustainable development initiatives in Ireland need to come from the state with solutions rather than relying on bottom-up and individual, community-driven efforts. Type 6 perspective calls for a new growth model which places emphasis on technologies and innovations to deliver economic growth. This is very similar to IPCC's proposed strategic analysis around sustainable development, for example using cost-benefit analysis,

real-option analysis, or scenario-based methodologies to strategize decision making in sustainable development (IPCC 2013, Chapter 17).

Regarding the procedural challenges, Type 2 and Type 5 perspectives both emphasize on the communication among stakeholders in sustainable development. Type 2 perspective advocates an inclusive and open stakeholder dialogue while Type 5 supports coordinated and holistic approach of the three pillars in sustainable development. The focus on open dialogues and stakeholder coordinations correspond to Carley & Christie's (1992, p.39) argument that stakeholder collaboration should aim for consensus building rather than subordination. For both types of perspectives, the main challenge of sustainable development in Ireland is ineffective communication processes. An ideal communication model should provide links between environmental issues and socio-political processes. Ireland needs strategic communication to ensure collaborations between key players, linking the government, companies and research centres to foster knowledge around sustainable development.

Regarding the social challenges in achieving sustainable development in Ireland, both Type 3 and Type 4 perspectives regard human factors the core challenges in achieving sustainable development goals. This responds to FitzGibbon & Mensah's (2012) assertion that wicked problems are stakeholder dependent. Type 3 perspective calls for mobilization of the public to increase awareness and behavioural change in sustainability, whereas Type 4 perspective contemplates on the inability of human beings to tackle sustainable development problems due to multiple challenges and dissensus on solutions. Both Type 3 and Type 4 perspective address the limitations for environmental policies to induce behavioral change due to the 'value-action gap' (Jackson 2005). The notion of mobilizing awareness and behavioral change suggest that societal discourses in sustainable development should be highlighted (Blühdorn 2011). Furthermore, Type 3 and Type 4 perspectives imply that there are strong links between human endeavours leading to sustainable or unsustainable development, and that sustainable development has the potential to address fundamental challenges regarding humanity (Hopwood et al. 2005).

There are also differences among the six types of perspectives regarding their proposed communication approaches for Ireland to achieve sustainable development. Type 2 and Type 5 perspectives are more opened-end regarding the communication approaches in

sustainable development, with open stakeholder dialogues. For example, the most ideal situation for Type 2 perspective would be that all stakeholders are actively participating in the discussions of sustainable development (experts and non-experts), and that no particular stakeholder would be driving the sustainable development agenda. The communication goals around sustainable development would aim towards achieving consensus building among all stakeholders. On the other hand, Type 5 perspective proposes a coordinated, supportive role of communication in sustainable development. Type 5 perspective also signals the lack of leadership and champion in Ireland's sustainable development. However, from the analysis it is not clear whether the state, or any particular stakeholder group should be responsible for coordinating communication around sustainable development in Ireland.

Type 1, Type 3 and Type 6 perspectives are more specific about their proposed approaches in communication around sustainable development, especially regarding the stakeholders at stake. For example, the systemic change proposed by Type 1 perspective signals more efforts from the state. Type 3 perspective focuses on communication to the public stakeholders, whereas the technological solutions proposed by Type 6 entails single, closed-end framework on political and economic development. As for Type 4 perspective, it focuses on fatalistic discussions around issues and challenges in sustainable development, and do not suggest any concrete communication approaches.

7.3.3 How do participants from the feedback discussions regard the representativeness of these six perspectives?

To evaluate the representativeness of the Q methodology study results and identify any missing perspectives, we invited participants from the Q methodology study to give feedback on the study results. A total of 11 participants responded to the invitation.

Regarding how the six perspectives captured in this study are reflected in practice, participant #1 uses sustainability conferences to illustrate the different types of dialogues between stakeholders. She points out that during a sustainability gathering in Dublin, the whole debate was about commercializing Dublin, innovation and economic growth model. There were a lot of business people who have the 'investment' perspective and emphasize purely on market opportunities. Thus the stakeholders at this conference resonances with

Type 6 perspective. However, since only one participant from the green business sector participated in this study, Type 6 perspective only constitutes one participant. Participant #10 further argues that Type 6 perspective seems rather 'extreme' compared to the other 5 types of perspectives. His comment responses to the low correlations between Type 6 perspective with the other five perspectives.

Both participant #14 and #17 recall from their interactions with various stakeholders that some people closely resemble with some perspective types captured in this study. Participant #14 says that he could see his family members having different types of perspectives corresponding to the analysis. He says that the Q methodology study is a good approach to capture the psychological dimension of different types of stakeholders in sustainability. Participant #17 agrees that the 6 types of perspectives capture well the viewpoints around sustainable development in Ireland. She recalls conversations between several stakeholders during discussions around sustainable development in Ireland, where she can identify several types of perspectives captured in this study, held by them.

However, some participants criticize the typologies of perspectives captured in the Q methodology study. For example, participant #2 points out that perspectives around sustainable development should be highly interlinked rather than made distinctive. She finds it challenging to fully associate with any of the perspectives. Her feedback responds to the factor analysis result in which that she is exactly a 'confounder'- a participant whose Q sort loads significantly onto multiple factors. Her feedback confirms the validity of the Q methodology factor analysis, and demonstrates that the qualitative results correspond to the quantitative ones.

Missing perspectives

Regarding missing perspectives from the Q methodology study results, a lot of participants mention that the analysis did not capture the 'denier' perspective. Participant #1 states that there are a lot of people out there who would not admit that there is a problem with unsustainability. Even if they are aware, they are not convinced that their actions would have an impact. Participant #9 also points out that there are people who have completely 'given up', who are completely fatalistic. However, in Type 4 perspective, debates around sustainable development are quite fatalistic, indicating that those who have given up might associate with this perspective, but in a more passive or subdued manner. In other words,

the group of people which participant #9 refers to might not participate in discussions and debates regarding the pessimistic and limited opportunities of sustainable development approaches, but their behaviors might demonstrate the characteristics captured by Type 4 perspective.

Similar to participant #9, participant #10 argues that there are people who are somewhat 'detached' from the sustainable development debates. These people regard the sustainable development outlook beyond their own controls, due to the 'big players' like US and China taking part in global, large-scale environmental decision making processes. These people think that Ireland is a comparatively small nation and would not be significantly affected, or that contribution would not be enough to mitigate climate change issues and make a huge difference. This group of people would somewhat, says participant #10, fit into the target communication audiences for Type 2 and Type 3 perspectives, in the sense that they are those who need to be mobilized and educated. Participant #13 says that there exists the 'detached, unaware' group of people who are not engaged with sustainability. She points out that one of the biggest challenges in sustainable development is that the experts would often assume that people want to be engaged, whereas it is not necessarily the case.

On the other hand, participant #11 points out that the analysis seems to exclude the fundamentalists and deep green perspectives. This is expected as the participants in this Q methodology study come from various sustainable development disciplines and they are mostly experts rather than people from activist groups or those with alternative lifestyles.

To sum up, from 11 participants' feedback discussions on the Q methodology study results, despite some missing perspectives, the participants identify with the perspectives captured in the analysis and agree that they represent the current perspectives around sustainable development in Ireland. Participants' individual perspectives also correspond to their Q sorts' factor loadings in the statistical analysis. The evaluation on our Q methodology study using participants' feedback on the results demonstrates the validity of our analysis and strengthens the associations between the quantitative analysis and qualitative interpretations. However, since only 11 out of 28 participants took part in the feedback discussions, it is questionable whether the other 17 participants who took part in this study and whether stakeholders outside this study would share similar perspectives. Future studies with large-scale surveys are needed to evaluate the results of this study.

7.3.4 What are the opportunities and challenges in stakeholder communication among these six types of perspectives?

This subsection examines the opportunities and challenges in stakeholder communication among the six types of perspectives generated from the Q methodology study results:

Regarding the opportunities in stakeholder communication among the six types of perspectives generated from this study, first, the highly correlated factors in the six-factor solution indicate that different perspectives are overlapping. The overlapping perspectives imply that with sustainable development issues being wicked, visions and approaches are likely to intersect. Dryzek & Niemeyer (2006, p.634) state that for the majority of contemporary political theorists, consensus is the principle for political justification and deliberation. From the analysis in this study, consensus building around sustainable development in Ireland would be achievable with perspectives that manifest around similar viewpoints. The potentials for various perspectives to marry each other also indicate the possibilities to reach consensus on sustainable development solutions and reduce uncertainties in stakeholder dialogues. The observation of overlapping perspectives in our study and their potentials to provide a framework for consensus building in sustainable development responds to Webler et al.'s (2009) assertion that Q methodology studies have the potential to engage stakeholders having different viewpoints and fill in vital information gaps (Cairns 2012; Ellis et al. 2007).

From the participants' feedback discussions, they recognize and identify with the six perspectives capturing the main viewpoints regarding communication around sustainable development in Ireland. Furthermore, they could relate particular perspectives shared by their colleagues in the field of sustainable development. The well-match perspectives between those captured in this study and in practice indicates that Irish stakeholders are familiar with the discourses in sustainable development. Their ability to identify and associate oneself or others with different perspectives demonstrates the existing knowledge and understanding of discourses around communication in sustainable development.

However, there is a danger for results from the Q methodology to impose frames on the participants (Cuppen et al. 2010). In other words, it might be confusing to have multiple interpretations of sustainable development (Hopwood et al. 2005). Levin et al. (2009) also

point out that stakeholders having diverse interests are very likely to interfere with each other's policy preferences. In our Q methodology study, six types of perspectives generated from 28 participants are quite extensive. In practice, it might be challenging for stakeholders to comprehend all the perspectives presented in this study. At the same time, having too many perspectives around sustainable development makes it harder to achieve synergy among stakeholders. In addition, conflicts might arise for stakeholders in higher hierarchy environment, which inhibit participation and engagement approaches (Roberts 2000).

Cuppen et al. (2010) also experienced having extensive perspectives in their Q methodology study, in which they extract six perspectives from a study on stakeholder perspectives in biomass in The Netherlands, instead of two to four perspectives, like in most Q methodology studies. Cuppen et al. (2010) argue that having many perspectives in their Q methodology study results signals that biomass issues are controversial and complex, which include a range of viewpoints and knowledge. In their study to explore discourses on international environmental regime effectiveness with Q methodology, Frantzi et al. (2009) discover that there are a range of opinions regarding the criteria of effectiveness even though their participant sample of the study is quite narrow. Results from Cuppen et al. (2010) and Frantzi et al.'s (2009) Q methodology studies show that with complex study subjects, factor analysis is likely to tease out higher number of perspectives to accommodate the complexity of discourses.

There are also limitations for sustainable development to address intergenerational issues (Redclift 2005; Parris & Kate 2003). The inability to address intergenerational issues correspond to the paradoxes shown in environmental decision making process in which the public and decision makers often tend to be fixated on short time horizons or immediate gratifications. By and large the existing accounts fail to explain this paradoxical phenomenon. There are also risks associated with being too rigid with one perspective without seeking alternative solutions. For example, if some stakeholders decided to become fixated on one of the perspectives and fail to recognize the benefits of including other perspectives, collaborations and communication across disciplines and sectors could become stagnant. With perspectives identifying different challenges and approaches in sustainable development, it might also result in stakeholder communication heading towards dissensus and fragmentation rather than seeking consensus.

From the post-sorting interviews and the six perspectives drawn from the analysis, it could be observed that the Brundtland definition of sustainable development has not been emphasized or discussed by the participants. The focus around sustainable development with an emphasis on future and current generation have been replaced by discourses and discussions in how to tackle unsustainability and addressing the gaps between the three main dimensions in a capitalistic, growth-driven society. Brundtland's definition seems to remain an oxymoron in a sense that conflicting goals, especially in the environmental and economic dimensions, have become a greater problem than addressing the needs for the future generations. The analysis in our study illustrates the inability of the Brundtland definition in providing tangible actions and solutions for compromising between multiple dimensions in sustainable development, and shows that discourses around sustainable development, even for a small nation like Ireland, among a small group of 'green pioneers', reflect on very complex perspectives far more complex than the Brundtland's definition.

The study findings have teased out the importance of some of the aspects in the social dimensions of sustainable development, for example, Type 2 perspective addresses the importance of public empowerment and participation in the debates and discussions of sustainable development, while some participants from the engineering discipline (participant #12 and #28) have also expressed concerns in social equity, transparency, and education in sustainable development. However, the imbalances of the social/political dimensions of sustainable development addressed in the literature has not been captured in the analysis. This might indicates that the participants in the Q methodology study do not regarded the imbalances a huge issue due to the fact that they are elites in the society, with resources and power to ensure environmental efficacy.

Yet another limitation of the analysis is the inequalities in stakeholder dialogues. The population sample in this study consists of members of an elite section of the Irish society. These 'green pioneer' stakeholders who participated in this study are supported by resources, recognized by their social status, and therefore they are empowered to actively engage with sustainable development. However, under conditions where there are inequalities in power and efficacy, where people have neither the means or supports to engage with sustainability, there is a danger of stakeholder dialogues still being expert-driven and conversations maintain 'closed' rather than transparent. Dryzek & Niemeyer (2006,

p.637) also point out that there is a danger of deliberation aligning with the interests of the more powerful, and excluding marginalized views.

From the analysis of the six perspectives extracted from the Q methodology study, both Type 2 and Type 3 perspective point out the importance of public engagement and empowerment, as well as increasing efficacy of engaging with sustainability through education. Stakeholders associated strongly with these two perspectives recognize the issues of power inequalities and call for fairer distribution of resources. More discussions around Type 2 and Type 3 perspectives are essential to help tease out how stakeholder dialogues should take into account the situation where some interest groups and voices are underplayed, and to ensure better analysis of stakeholder perspectives. Stakeholder dialogues, especially regarding complex issues such as sustainable development, should take into account the transparency and equality of stakeholder participation, and ensure that all voices are included.

One aspect for further investigation and frame of stakeholder analysis could be stakeholder conflict management and the transformation of stakeholder dialogues with deliberative democracy. In other words, it might be useful for the stakeholders to engage in the process of identifying opportunities and risks with communication issues around sustainable development. The analysis from our study demonstrates that some of the 'green pioneers' are aware of the issues regarding inequalities, and that they have proposed possible solutions (community collaboration, education) to transform the business-as-usual stakeholder dialogues towards a power-and-efficacy equality driven one. However, more meta analysis and efforts in effective stakeholder conflict management are needed to ensure the transformation of a new paradigm of stakeholder engagement and dialogues- which focus not merely on consensus building and conflict resolution, but also critically examine the equality of all stakeholders taking part in the discussions of complex issues.

In our Q methodology study, the diversity of perspectives reflect multi-faceted realities constructed by participants who are engaged with sustainable development issues in Ireland. In political ecology, diverse thinking and integrated knowledge and values also contribute to environmental decision making processes and policies (Barry 2007). However, it remains debatable whether higher or lower factor solutions contribute to a better analysis in studies around sustainable development. On the one hand, higher factor solutions could offer

complex analysis and tease out more nuances; on the other hand, too many factors in the final analysis might result in fragmented solutions.

7.4 Discussions on the limitations of the Q methodology study

In the research design chapter (Chapter 3), we already discussed the strengths and weaknesses of the overall methodological design (see 3.4). This section discusses the limitations of the main Q methodology study and how they contribute to the validity of this study.

7.4.1 Limitations in the selection of the Q concourse

There are several weaknesses in the selection of the Q concourse in this study. First, there is a lack of structured sampling method for the Q concourse. For example, this study uses an inductive factorial design to extract categories and theoretical codes for the selection of Q statements (see 3.3.1 & Chapter 5) rather than applying structured sampling method for the Q concourse such as Dryzek & Berejikian (1993) 4X4 matrix grid to categorize the Q statements and to ensure a balanced representation of the Q concourse. With less systematic approach in the Q concourse selection, there is a danger to under- or over-sample certain concepts regarding the subject of study, or incorporating the researcher's bias into the final Q statements (McKeown & Thomas 1988). It is also more challenging for less-structured Q concourse to be replicated, which lowers the reliability of the Q concourse (Brown 1980). The inductive factorial design of the Q concourse might have resulted in an unbalanced selection of the Q statements, which is reflected in the factor analysis results of this study. For example, there are 6 confounded participants from the six-factor solution analysis (see 6.1.4, Table 6.6), indicating that these participants don't load highly on either of the six factors. Some factors are also highly correlated, indicating overlapping and shared concepts (see 6.1.5, Table 6.9). The justification of selecting a factor solution in this study then relies on which factor solution provides the best qualitative interpretations (see 6.3).

There are also weaknesses in the final selected Q statements. Several Q statements contain complex, multiple clauses (see 5.3, Table 5.4). Having multiple clauses in a Q statement

makes the Q sorting process more challenging for the participants. For example, a few participants point out that statement #9 (*Sustainable development can also be viewed as a scientific and technological endeavour. Science and technology are amongst the most effective means to enhance socio-economic development in Ireland*) has two clauses, and they have difficulties deciding where to place the card with this statement on the forced distribution, since they might agree with the first clause (*Sustainable development can also be viewed as a scientific and technological endeavour*) but not the second one (*Science and technology are amongst the most effective means to enhance socio-economic development in Ireland*). In addition, the use of language and wording of the Q statements could also be improved to make the Q statements more specific and less ambiguous. Having some Q statements which are too abstract limit how well the factors could be interpreted.

7.4.2 Limitations in the selection of the P (Participants) sample

There are several limitations in the selection for the P (Participant) sample. First, it is questionable whether having 28 participants would be enough to capture the diversity of stakeholder perspectives around sustainable development in Ireland. By having small number of participants in the P (Participant) sample, the factors extracted from the analysis in this study are less strongly supported, with only 3-4 participants loading onto each factor, producing relatively low study variances.

In the Q methodology study, we also rely on the 'snowball' approach, where we asked participants to suggest potential participants. Since the participants are more likely to recommend people that they are familiar with or their colleagues, or the ones that they have collaborated on projects before, it might reduce the degree of diversity in stakeholder views, or result in a more 'closed' stakeholder perspectives where they are similar but less contrasting. This seems to reflect our study results, where 5 Types of perspectives have relatively higher correlations, and that only Type 6 perspective is highly distinctive.

It is also difficult for the selection of the P (Participant) sample in this study to maintain a balanced representation of sectors (see 3.3.2, Table 3.2 for the demography of participants). The unbalanced representation of sectors is captured in the final results. For example, in Factor six (Technocratic Solutions), there is only one participant (#3), resulting in a low study variance. This is perhaps due to the fact that in the P (Participant) sample, participant #3 is

the only one from the green business sector. With more participants from the business/economic sector, Factor 6 might have more participants. On the other hand, by including more participants from the business/economic sector, we might be able to derive factors from the analysis signalling to other types of business and economic solutions around sustainable development in Ireland.

Another limitation is the inability to capture changes in participants' perspectives due to adopting an extensive person-sample instead of an intensive one in the Q sorting process for the participants (McKeown & Thomas 1988). Based on an identical condition of instruction for all participants, the perspectives extracted from this study is cross-sectional and static. However, from the participants' feedback discussions regarding the Q methodology study results, several participants mentioned that there are changes in participants' perspectives over a period of nine months (see 7.3.3). Cuppen et al. (2010) also point out that viewpoints regarding complex issues are dynamic. We argue that longitudinal future studies are needed to observe perspective change in sustainable development.

7.4.3 The researcher's bias

We are fully aware of the researcher's bias in this study. For example, in the selection of the Q concourse, since this is a study with the aim to generate stakeholder communication strategies around sustainable development, the Q concourse is composed of communication-oriented statements. However, since communication issues are often very subtle and highly interdependent with other factors, it is challenging to derive distinctive clusters of Q sorts during the factor analysis (Cuppen et al. 2010). The other type of researcher's bias in this study lies in the interpretations of the factors. Shinebourne (2009) refers the factor interpretation as hermeneutic. This implies that even though the factor analysis presents the results in a quantitative manner, the researcher would still be very likely to rely on individual experiences, or flavoured theories to assist interpretation of the data. Nevertheless, the use of crib sheets (see 6.2.2) and participants' feedback discussions (see 7.3.3) help reduce the researcher's bias by offering both systematic and evaluated approach to data interpretation and validation.

7.4.4 Validity of the study

To conclude, we are fully aware of the limitations in this study and their implications, and have taken them on board during the interpretation and analysis of the study results. We argue that despite the limitations addressed above, the validity of this study remains intact due to the sophistication of the mixed-methods approach in this study:

In-depth qualitative analysis

The 28 post-sorting interviews following the Q sorting provide additional information for qualitative interpretations and discussions around the Q statements. These interviews help improve and clarify ambiguity of concepts presented in the Q statements and help the researcher articulate the diversity of stakeholder perspectives around sustainable development in Ireland. By interpreting the post-sorting interviews and incorporating quotes from the participants to support the quantitative data, the results demonstrate coherent and distinctive representations of stakeholder perspectives around sustainable development in Ireland. In addition, the participants' feedback discussions regarding the Q methodology study results provide insights and feedback to the missing perspectives captured in this study (see sections 3.3.6 & 7.3.3). The participants' feedback discussions also validate the study results and researcher's interpretations of these results by demonstrating that the participants associate with the analysis presented in section 7.2 & 7.3.

Iterative quantitative analysis

From a quantitative perspective, conducting the factor analysis of four-, five-, and six-factor solutions increases the validity of the results by comparing the qualitative concepts derived from different statistical results (Watts & Stenner 2012). This demonstrates that the analysis in this study has moved beyond the numerical representations of data (Ramlo & Newman 2011). Watts & Stenner (2012) points out that with an abductive approach, the researcher observes and studies the data in seek of an explanation to generate new insights, which is different from inductive approaches where the aim is to attach descriptions to the observed phenomenon. For example, the nuances detected across four-, five- and six-factor solutions in this study demonstrate the abductive approach to the analysis. By comparing similarities and differences across four-, five- and six-factor solutions, we observe and investigate overlapping perspective as well as missing perspectives. This iterative process ensures a

successful selection of the optimal factor solution and ensures the validity of our Q methodology study.

Subjectivities captured in the Q methodology study

The objective of our Q methodology study is to tease out perspectives and nuances in stakeholder perspectives around sustainable development in Ireland, rather than testing hypotheses. Thomas & Baas (1992) argue that Q statements organized in various ways can nevertheless provide the same conclusions, indicating that there is no single, correct way to construct the Q concourse. Brown (1980) also argues that regardless of the structure for the Q concourse selection, the most crucial part is to ensure that the Q statements are broadly representative. Eventually it is the participants who give meaning to the Q statements through the sorting process (Brown 1993). This indicates that the structure for the Q concourse selection and how the researcher come to a balanced set of Q statements are not significantly important (van Exel & de Graaf 2005).

In this study, the materials for Q statements are collected through multiple resources (literature, policy papers, semi-structured interviews), obtained in a number of ways. The various stakeholder discussions teased out from these multiple resources ensure the sophistication of the concourse (Brown 1993). Therefore, we argue that the lack of theoretical framework for the selection of Q concourse and the imperfections in formulating the Q statements do not strongly impact the validity of the study. The mixed-methods approach in this study, which generates and triangulates quantitative and qualitative results, has successfully answered the research questions addressed in the introduction chapter of this study. Although having small P (Participants) sample in Q methodology study makes it more difficult to generalize the outcomes of the study, ''Q methodology does give objective, statistically robust results'' (Curry et al. 2012, p.22).

In this chapter, we have presented an in-depth analysis of the six-factor solution for the Q methodology study, as well as discussions and interpretations of each individual factor. To investigate the validity of the Q methodology study, we also invited participants to discuss the representativeness of the results and reflect on missing perspectives. The implications and limitations of the study results are also addressed. The next chapter- chapter 8- concludes on this study.

Chapter 8 Conclusions and Recommendations

This chapter concludes our study on stakeholder communication around sustainable development in Ireland, by addressing the research questions in our study, discussing the contributions of this study, and recommending future studies. Section 8.1 addresses the research questions raised in the introduction chapter. Second 8.2 discusses the contributions of this study for both academia and practice in the areas of sustainable development. Section 8.3 scopes potential studies for future research.

8.1 Addressing the research questions

In our study, we have identified six stakeholder perspectives regarding communication around sustainable development in Ireland. We have also investigated how a communication analysis using mixed-methods study with Q methodology contribute to disparate perspectives around sustainable development in Ireland. In addition, we have attempted to translate empirical analysis into practical outputs by drawing up requirements for a communication toolkit, with guidelines for stakeholders around sustainable development in Ireland (see Appendix A). In the following subsections, we address the research questions raised in the introduction chapter (see Chapter 1, section 1.2):

- How would modes of communication between disparate perspectives contribute to the discussions around sustainable development among stakeholders in Ireland?
- How could a stakeholder communication analysis contribute to complex political, economic and social factors in sustainable development in Ireland?
- How would stakeholders respond to the stakeholder communication analysis around sustainable development?
- What are the most prevalent stakeholder perspectives regarding sustainable development in Ireland?
- Furthermore, what would be the requirements for a communication toolkit for stakeholders around sustainable development in Ireland?

We address the questions above by discussing: the contributions of modes of communication between six disparate perspectives, the contributions of a mixed-methods

communication analysis in sustainable development, stakeholders' responses to the communication analysis, and the requirements for a communication toolkit.

8.1.1 The contributions of modes of communication between six disparate perspectives

From the factor analysis results (Chapter 6) and full factor interpretations (Chapter 7) in our Q methodology study, we identify six stakeholder perspectives around sustainable development in Ireland. The results confirm that there are quite a number of disparate perspectives regarding stakeholder communication around sustainable development in Ireland. The typology of six distinct perspectives (see 7.1 & 7.2, Table 7.1) are: 1) Environmentalism with new regulatory regime: stakeholders associating with this perspective are pessimistic about Ireland adopting a growth model in sustainable development and argue that sustainable development model in Ireland should be systemic, expert-driven, and government-led 2) Postmaterialism and egalitarianism: stakeholders associating with this perspective are optimistic regarding sustainable development in Ireland, and argue for more inclusive stakeholder communication models 3) Environmental efficacy with public mobilization: stakeholders associating with this perspective are pessimistic regarding the Irish public's attitudes towards sustainable development and call for more incentives to engage the public in sustainability 4) Fatalism in sustainable development: stakeholders associating with this perspective are fatalistic, arguing that there is no consensus on solutions for multiple challenges in sustainable development 5) Strategic communication: stakeholders associating with this perspective propose to enhance integrative approaches in sustainable development 6) Technocratic solutions: stakeholders associating with this perspective call for Cleantech and an emphasis on the economic dimension to drive sustainable development in Ireland, with regulatory and expert-driven approaches.

These six perspectives are shared modes of engagement rather than corresponding to specific stakeholder types (see 7.3.1), illustrating heterogeneous stakeholder communication teased out from the literature (see 2.1.1) and the need for multidisciplinary stakeholder approaches in complex issues (see 2.3.2). These perspectives also demonstrate the complexities around sustainable development in Ireland and how it is impossible to build consensus with a 'single, straightforward' solution. Rather, stakeholder communication

strategies are essential in addressing challenges around various modalities of stakeholder consensus building, dialogues, collaborations and social learning between different stakeholders (see 2.3.3). The heterogeneous perspectives extracted from the study signals a strong need for stakeholder collaborations and multidisciplinary efforts to achieve sustainable development in Ireland. It could be concluded that the shared perspectives among sectors demonstrate that modes of communication are not necessarily disparate among different sectors, but instead there are potentials in developing mutual strategies and solutions around sustainable development among stakeholders from various disciplines (see 7.3.2). For example, stakeholders sharing Type 1 and Type 6 perspective could work out solutions around regulatory frameworks to support the transition of green incubations in Ireland. Stakeholders who share Type 2 and Type 3 perspectives could facilitate public initiatives around sustainability to increase awareness. Stakeholders who share Type 4 and Type 5 perspectives could coordinate and liaise sustainable development projects between centralized and bottom-up approaches, since they focus more on the multiple issues and strategic outlook around sustainable development issues.

It is therefore argued in this study that, instead of regarding disparate perspectives barriers to communication around sustainable development in Ireland, we should aim to 'get the whole system in the room' (see 2.3.3, Roberts 2000). That is to say, in solving wicked problems like sustainable development, stakeholder conflicts could be reduced if we could focus on the learning process and try to understand that there are some merits in other stakeholders' proposed solutions. Roberts (ibid) 'inquiry' approach is very much needed in Ireland, when efforts across sustainable development are too fragmented and dispersed (see 4.2 and concluding remarks in 4.6). From discussions around the criteria for a communication toolkit (see Appendix A, section A.1), it could be further observed that stakeholders desire for flexible, coherent and effective stakeholder communication strategies around sustainable development in Ireland. In other words, stakeholders point out the necessity for modes of communication around sustainable development with more opened stakeholder dialogues, more concrete guidelines for interacting with other stakeholders, as well as evaluations for communication processes.

However, these proposed criteria are challenging to achieve, as modes of communication are perpetually changing in response to the complexities in environmental, social and economic dimensions in sustainable development (see 2.1.1), and especially how stakeholder

perspectives are shaped and formed accordingly to these changes. We could argue that is then almost impossible to draw up a set of universal strategies or guidelines to anticipate how modes of communication among disparate perspectives contribute to discussions around sustainable development. However, with our attempts to draw up the requirements for the communication toolkit in our study, which reflects the most current modes of communication taking place in Ireland among those who participated in our Q methodology study, we argue that further developments of the communication toolkit could manifest into larger-scale studies around the political, economic and social factors contributing stakeholder perspectives in Ireland.

8.1.2 The contributions of a mixed-methods communication analysis in sustainable development

It is concluded in our study that a mixed-methods communication analysis could successfully capture the subjectivities of stakeholder perspectives around sustainable development in Ireland with in-depth qualitative analysis and iterative quantitative analysis (see 7.4.4). Such analysis contributes to the understanding of various factors in sustainable development since it tries to cross-validate prominent issues in literature with the most current perspectives of stakeholders in various disciplines. For example, the qualitative-quantitative mix of the study further contributes to the validity of the analysis (see 3.4.1 & 7.4.4). The study begins with an open, non-intrusive inquiry into literature around most prominent issues in sustainable development (see Chapter 2). Simultaneously semi-structured interviews are carried out to examine most current stakeholder perspectives around the political, economic and social factors in sustainable development in Ireland (see Chapter 4). A concourse is built from the literature review as well as the semi-structured interviews to inform the Q methodology study (see Chapter 5). The multiple steps (see 3.3) leading into the main Q methodology study ensures complexities of the study material. The quantitative factor analysis in the Q methodology study also contributes to the study by offering a systematic, objective way to capture the subjectivities of the stakeholder perspectives, and by selecting the optimal factor solution for our analysis (see Chapter 6).

Although one can't overlook the limitations and challenges of applying mixed-methods and imperfections in the Q methodology (see 3.4 and 7.4), there are great values in applying mixed-methods research. The Q methodology design in this study demonstrates the capacity

to tease out communication around complex political, economic and social factors in sustainable development in Ireland (see 7.3.4 and 7.4). The nuances in the study results regarding six types of perspectives and rich stakeholder discussions would not have been captured by a single, qualitative case study or anonymous surveys (see 3.1). We argue that, in investigating 'wicked' problems such as communication around sustainable development, a multi-layered communication analysis is needed. Q methodology- an explorative and intensive research methodology with statistical analysis as well as qualitative interpretation designs (see 3.2.3) - has proved to achieve the objectives of our study.

8.1.3 Stakeholders' responses to the communication analysis

Regarding how the stakeholders respond to the communication analysis on stakeholder communication around sustainable development in Ireland, the participants' feedback discussions (with eleven participants taking part) to discuss their opinions regarding the Q methodology study results (see 3.3.6) show that they are satisfied with their individual results as well as the typology of six perspectives representing communication around sustainable development in Ireland (see 7.3.3). Most participants could relate particular perspectives to their colleagues or people in the field, indicating that we have successfully captured the most prevalent stakeholder perspectives around sustainable development in Ireland.However, some stakeholders have pointed out missing perspectives, for example the 'deep-green' perspective or 'denier' perspective (see 7.3.3). The missing perspectives imply that there might be weakness in the sampling method, indicating that the P (Participants) sample could be better selected for future studies to capture wider perspectives (see 7.4.2).

We conclude that the participants' feedback discussions in our study after the main Q methodology study, is a good way to demonstrate how our Q methodology study could be evaluated to confirm or defy the six perspectives generated from our Q methodology study, by investigating the rationales from the stakeholders. The evaluation has proved to be a good way to validate our study and reduces researcher's bias and unnecessary speculations for concluding the study (see 3.4.4).

8.1.4 The requirements for a communication toolkit

The unique part of our study is that we have attempted to translate the empirical study results to practical outputs- by drawing up requirements for a communication toolkit (see

Appendix). The actualization of the communication toolkit requires further developments and collaborations with designers and researchers in future studies.

The requirements for the communication toolkit are discussed during the participants' feedback sessions (see 3.3.7 and Appendix A, section A.1). The participants call for a flexible, coherent and effective design, which consists of three parts in the communication toolkit (RUS): recognizing, understanding, and strategizing (see Appendix, section A.2). We propose that a communication toolkit should present information regarding the typology of various perspectives captured from the Q methodology study (see Appendix, section A.2.1) and illustrate the strengths and weaknesses of communication across various types of perspectives (see Appendix, section A.2.2). The toolkit should also provide several guidelines for stakeholders to strategize communication around sustainable development (see Appendix, section A.2.3). We argue that the proposed idea of a communication toolkit and the design requirements is unique in this study, since we try to make communication a reality from research. If the toolkit could be actualized and popularized in practice, it could enable researchers as well as participants to examine various modes of communication, possible interactions and conflicts among modes of perspectives, and strategize around communication in sustainable development.

8.2 Contributions of this study

This section discusses the contributions of this study for academia research and practitioners in the areas of sustainability:

8.2.1 Contributions in academia and research

This study has a number of contributions to areas of research in communication round sustainable development. First, our Q methodology study as a mixed-methods approach enables iterative, qualitative, and quantitative interpretations of an empirical study (see 7.4.4). The Q concourse in the Q methodology study (see Chapter 5) represents existing theories and discourses around sustainable development teased out by literature (see Chapter 2) as well as the current stakeholder perspectives around sustainable development in Ireland from the semi-structured interviews (see Chapter 4). The Q sorting process (see 3.3.4) provides observations of which discourses remain (or become) the major debates around current issues in communication around sustainable development in Ireland, which is

later captured by the factor analysis results (see Chapter 6). Findings from our study also contributes to building knowledge for existing policy, community, and scientific efforts in achieving sustainable development in Ireland. The communication analysis provides implicates for interactions among stakeholders sharing different viewpoints and suggest grounds for deliberative process and engagement to facilitate debates and discussions.

Several scholars have also pointed out the usefulness of Q methodology for the development of policy, such as adding values to decision making via stakeholder participation and policy dialogues (Curry et al. 2012; Cuppen et al. 2010; Ellis et al. 2007). The results from our Q methodology study could also contribute to areas of policy research in sustainable development, planning and management for sustainability and governance, as well as social initiatives and community efforts in stakeholder communication. There are huge potentials in our study in delivering knowledge for areas of multidisciplinary research, as well as facilitating social learning among stakeholders.

8.2.2 Contributions in practice

Regarding the contributions of our study for practitioners, the typology of six perspectives regarding communication around sustainable development in Ireland suggest various modes of communication among stakeholders. This is valuable for practitioners, as the results can assist them to identify and anticipate conflicts arising from communication around disparate and distinctive perspectives, since communication is highly dynamic and contextual. For example, insights into stakeholder perspectives could be beneficial for policy development by the state as well as local authorities. For NGOs, identifying modes of communication allow them to formulate more effective strategies to mobilize communities and design effective communication messages to induce behavioral change and embrace sustainability. Collaborations between academia and business sectors could also benefit from improved stakeholder dialogues, allocating communication champions and tailor-made media strategies.

The study is also valuable for practitioners in the way that it allows abundant interactions between the researcher and practitioners. For example, throughout the whole research, from data collection of the semi-structured interviews, factor analysis, to participants' feedback discussions on our Q methodology study results, all steps are closely linked to these

participants, who represent the most current practitioner's perspectives in Ireland. The research design of our study is highly participatory, which ensures that the experts' and practitioners' input are greatly valued and considered. In addition, our attempts to translate the research results into a communication toolkit also provide guidelines for more effective communication and collaboration among stakeholders. The communication toolkit provides alternative means to rethink communication around sustainable development.

8.3 Recommendations for future research

The previous section discusses the contributions of our study in academia research and practice. In this section, we propose several potential angles to further develop and extend the current study:

8.3.1 Capture sectoral and cross-national perspectives around sustainable development

More in-depth interviews and discussions with stakeholders from each sector in Ireland could be carried out to tease out the communication opportunities and challenges around sustainable development from sectoral perspectives, and further compare them to the six perspectives captured in our Q methodology study. Future studies could also compare perspectives across nations, comparing the types of perspectives around how each nation identify as the most prevalent issues and solutions in sustainable development. This could contribute to the dynamics of stakeholder collaborations on a cross-national level, as well as global policy making and management in sustainable development issues.

8.3.2 Conduct field observation and evaluation on sustainable development activities

We also call for additional field studies and observations to collect more data regarding the characteristics of the six types of stakeholder perspectives (other types of stakeholder perspectives, for example the missing perspectives not captured in this study) in sustainable development. Assessing different forms of stakeholder communication activities, for example conferences, seminars, round table discussions and public consultations around sustainability issues, could further add to the data collection. Researchers could be observers

at national and international sustainable development conferences, seminars, meetings and panels to note down and identify the different types of perspectives and record modes of communication, collaborations and interactions between stakeholders.

8.3.3 Carry out large-scale survey studies and build extensive data

Q methodological study findings could only be generalized in terms of concepts and theoretical modes, but not population. The generalizability of the Q methodology results needs more empirical and subsequent research (see 3.4.3). Q methodology studies have the capacity to reveal original categories and therefore could be useful in informing survey research. To generalize the Q methodology study results to a larger population, future studies could look into large-scale surveys to tease out more detailed profiles of stakeholders and investigate political, social, and behavioral factors contributing to various modes of communication around sustainable development. Regression models could be applied to investigate the associations between different perspectives. Such large-scale surveys could contribute to building on extensive data around stakeholder perspectives around sustainable development, on a national or global scale.

8.3.4 Apply the research design to stakeholder perspectives around complex problems

Our Q methodology study results tease out various modalities of communication (see 7.3.2 and 7.3.4). We suggest that studies around complex scientific issues which highly associate with human factors (i.e. GM food, nanotechnology, fracking, nuclear power) could also adopt a Q methodology design to investigate whether applying Q methodology study to other areas of scientific issues would generate similar stakeholder perspective types. If that is the case, then perhaps we could draw up some generic hypothesis for effective stakeholder communication strategies across various complex problems.

8.3.5 Develop and actualize the communication toolkit

There are potentials for Q methodology to play a role in policy analysis, as well as how Q methodology could be synergized with traditional policy making tools (Curry et al. 2012). In our study, we attempt to translate the empirical studies from our Q methodology study into practical outputs: requirements for a communication toolkit for stakeholders (see Appendix

A). However, we would like to emphasize that the six-factor solution presented in the toolkit is only an indication of how a Q methodology study could be translated into a matrix or guidelines to inform stakeholders from a specific case study, and we are not attempting to fit the data to the requirements in the toolkit. We argue that there are huge potentials to further develop the communication toolkit, by collaborating with multidisciplinary researchers, designers and practitioners in various areas of sustainable development to actualize and evaluate the toolkit. Case studies with local and community initiatives, local authorities, research institutions, green businesses, and etc., could provide great opportunities, where researchers could facilitate stakeholder workshops, trainings and dialogues using the communication toolkit, and formulate tailor-made communication guidelines for stakeholders to strategize communication messages and processes.

To conclude on our study, we would like to emphasize again that providing practical contributions from our empirical study results and linking various theories around stakeholder communication and sustainable development to multidisciplinary stakeholders in research and practice, remain an unique part of our study[1]. We look forward to actualizing the communication toolkit and potential collaborations with researchers and practitioners in the near future.

[1] For career prospect, the main author of this study, Chao-Ping (Pat) Hong, has been in contact with CiviQ- a startup company with products and services in citizen engagement using Q methodology- for potential collaborations. http://www.civiq.eu/about/

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Appendix A: Requirements for a Stakeholder Communication Toolkit in Sustainable Development

Appendix A presents the requirements for a stakeholder communication toolkit in sustainable development- this is an unique part of our study where we demonstrate how we would like to translate the empirical study and analysis, along with cutting-edge discussions from the experts in the fields of sustainable development during the Q methodology study, into a practical, hands-on product. Even though the actualization and evaluation of this toolkit is beyond the scope of this research, there are huge potentials for further elaborations and developments of the toolkit in future collaborations with designers, researchers and more stakeholders in national and international case studies.

In Appendix A, we will focus mainly on the requirements for building the toolkit, which are informed by the factor analysis and interpretations of this study, as well as participants' feedback regarding the Q methodology study results (section A.1). The requirements include flexibility, coherence, evaluation and impact of the toolkit. Section A.2 presents how we think the communication toolkit should look like. To translate the Q methodology study results into practical guidelines for stakeholders, we imagine the toolkit should consist of three parts (RUS): recognizing, understanding, and strategizing. The recognizing part refers to how stakeholders using this tool should be able to pick up signals to identify different types of perspectives according to their corresponding characteristics, and the communication modalities used by stakeholders associating with each different perspectives. The understanding part focuses on recognizing the strengths and weaknesses of each of the perspective. The strategizing part provides stakeholders with communication strategies to communicate to different stakeholders sharing either similar or different perspectives. However, we emphasize that this communication toolkit is still at its infancy and we are not aiming for any clearly defined instrumental strategies for stakeholders in the field of sustainable development. Rather, the toolkit should offer an opportunity for us to translate the analysis of the Q methodology study results and participants' discussions from the Q

methodology study into a set of comprehensive guidelines, designed for both researchers and practitioners in related fields of sustainable development.

A.1 Stakeholder discussions on the requirements for the communication toolkit in sustainable development

In this section, we will present and discuss the requirements necessary for designing a stakeholder communication toolkit in sustainable development. Effective communication strategies should be people-centred and focus on consensus building as well as long-term visions (Logan 2001; Miller 2001). Communication strategies around sustainable development should be able to identify and offer a wide range of solutions to sustainable development issues, support integration of various approaches, as well as provide a solid framework for policy and decision-making (Craig 2007; van Eijndhoven 1995). During the feedback discussions, participants express their viewpoints on the essentials of a communication toolkit. We extracted four major elements: flexibility of the toolkit, a coherent model of the toolkit, evaluation of the toolkit, and the impacts of the toolkit.

Regarding the flexibility of the toolkit, participants mentioned the importance of having a balanced communication model, open learning process, as well as providing stakeholders with opportunities to mix-and-match with different types of perspectives. The call for an 'open' design of the toolkit indicates that the design for a rational analytic toolkit would not be ideal for wicked problems (Roberts 2000). For example, during the feedback discussions, participant #1 mentions that certain types of perspectives have a 'closed' approach (i.e Type 1, Type 6), whereas some are more holistic (i.e Type 5). This implies that a toolkit with dogmatic instructions would not be ideal. For example, participant #17 says that the toolkit should enable opportunities for collaborating in sustainable development projects with open stakeholder dialogues and learning processes.

Participant #1 thinks that there are opportunities in stakeholder dialogues where every single type of perspectives is recognized and their strengths and weaknesses are identified. For example, stakeholder holding each type of perspectives, she says, will have their own favoured taste of sustainability outlook and solutions. This implies that the toolkit should identify potential collaborations as well as conflicts. For example, she points out that stakeholders holding Type 3 perspective, the public mobilization perspective, would be more

like to formulate messages around various sustainable development issues and solutions and communicate them to the public. These issues and solutions, however, would also be recognized and discussed by those who associate with Type 4 perspective, the fatalistic debates. Therefore, the toolkit should emphasize knowledge exchange for stakeholders. However, she also states that the success of the communication process is highly associated with whether the stakeholders are open to different approaches and opinions.

Another participant, participant #11, points out that the toolkit should not be a matrix that is too rigid, but instead offer a range of possibilities where stakeholders could read around the box. He sees the toolkit offering a 'blend' of communication modes for stakeholders, and suggests that the researcher provides a guideline or instruction to use the toolkit. The toolkit should offer predictions of how stakeholders could anticipate different modes of communication, instead of offering absolute answers. Participant #13 also thinks that the toolkit should be a fluent model where there are easy and simple ways to identify and recognize which stakeholder associate with what types of perspectives. The toolkit should include strategies for picking up the characteristics of different perspectives.

Regarding the toolkit having a coherent model, participants call for concrete steps to identify and strategize with different perspectives. For example, participant #9 suggests that it would be useful to pinpoint some 'signals' or communication 'languages' which are unique for different types of perspectives. The toolkit could help stakeholders to formulate strategies. It would be useful to suggest theories of communication strategies for collaborations and interactions among stakeholders. Participant #16 further suggests some 'word clouds' could be useful to identify and strategize communication between different types of stakeholders. For participant #28, the toolkit should include a model that would capture the techniques (strategies), actions, dialogues, venues, logistics, and incentives for different types of stakeholders. He also points out that despite the fact that this study only captures the micro level of stakeholder communication in sustainable development (representing 28 stakeholders from the Q study), there might be possibilities of extending the model to national and international scales.

Regarding evaluation of the toolkit, participant #14 suggests pilot tests, training exercises, educational programs as potential test-beds for the communication toolkit. However, participant #10 questions whether the toolkit would deliver fruitful impacts. He points out

that for academic researchers, a structured matrix would not be really practical. As for communication professionals, he thinks that it would be interesting to recruit them into the analysis in future studies, and investigate whether they would fall into certain types of stakeholder perspectives, especially the perspective types which place more emphasis on the stakeholder communication dimension in sustainable development. He further points out that if the communication experts only associate with certain perspectives, then perhaps the emphasis on communication around sustainable development should be reshaped.

Regarding the impacts of the communication toolkit, participant #15 argues that human beings are highly irrational. Therefore it is difficult to gauge the success of communication. At the same time, communication is highly cultural. Some cultures are more conforming, some coercive, and some more open and individualistic. This implies that in order to evaluate the toolkit, further studies on the profiles of individual stakeholders as well as the cultures of their organizations are needed.

To sum up, participants emphasize on a communication toolkit which enables open-learning, where stakeholders identify, interact and reflect on different perspectives in sustainable development. Participants also call for concrete steps and strategies for communicating with stakeholders sharing dissimilar perspectives. These criteria are taken into consideration for the design of the prototype of a communication toolkit. The next section proposes three steps in the toolkit: recognize, understand, and strategize.

A.2 What the communication toolkit could look like

The section introduces how we think the communication toolkit could look like, with three steps in the toolkit (RUS): recognize, understand, strategize. Stakeholders could go through these steps in the toolkit to identify the different types of perspectives around sustainable development in their lines of work, as well as formulate communication strategies. Again, we would like to emphasize that the following is not the finalized product nor a prototype of the toolkit. We are just providing some examples and suggestions to illustrate what we imagine a communication toolkit could look like.

A.2.1 Recognizing the characteristics in different perspectives

The toolkit could start by providing some key and condensed information for users to recognize the types of perspectives around sustainable development in Ireland. For example, a table listing different perspectives with key words could be helpful. Table A.1 lists the keywords and normative statements for each of the six perspectives derived in our Q methodology study. These keywords signal the core arguments associated with different types of perspectives. Stakeholders could use these keywords to position themselves as well as others regarding the types of perspectives that each stakeholder most strongly associate with. The normative statements demonstrate how stakeholders would most likely formulate a particular perspective.

Type of perspectives	Keywords	Normative statements
Systemic Revolution	Regulations Frameworks Expert-driven Systems Revolutions	Ireland needs a systemic revolution. The status quo in sustainable development is not working out. Ireland needs more national environmental regulations and frameworks which would respond well international policies. A top-down, expert-driven approach would be most ideal to drive sustainable development initiatives.
Multidisciplinary collaboration	Inclusive Stakeholders Collaborations Open Dialogues	Ireland should place more emphasis on multidisciplinary stakeholder models. Collaborations should include non-experts as well as experts to ensure open dialogues and interactions. A bottom-up approach is preferable to a top-down one in sustainable development initiatives.
Public Mobilization	Public Education Incentives Mobilization	Ireland needs to mobilize the public to engage in sustainability issues. Education and incentives are crucial to raise awareness and induce behavioural change. Top-down, regulatory approaches are too remote. Bottom-up approaches would be more effective in driving community-based sustainable development initiatives.
Fatalistic debates	Discourses Multi-challenges Multi-approaches	Ireland has limited time to tackle sustainable development issues. There are multiple challenges and multiple approaches. Discourses around sustainable development reveal its 'wicked' nature with marginal

	Time limit	discussions, and there is little that could be fixed or improved.
Strategic communication	Communication Holistic Integrative	Ireland should adopt an integrative communication model to accommodate the three pillars in sustainable development. A holistic and centralized approach could support stakeholder collaboration and link sustainable development practices to theories.
Technocratic environmentalism	Technologies Innovations Economy Growth	Ireland should focus on the development of Cleantech and innovations. A new economic growth and regulation-driven model would create incentives for green businesses and move sustainability forward.

Table A.1 Keywords and normative statements for recognizing 6 types of perspectives

However, some would probably argue that a table might not be the best way to present information, since it might get the impression that these perspectives are arranged in a hierarchical order. A pie chart or word clouds, for example, could be less misleading and user-friendly for the toolkit. An online toolkit for example, could be even better in providing opportunities for crowdsourcing and building an extensive database for various perspectives with regular updates.

A.2.2 Understanding the strengths and weaknesses of various modes of communication

The toolkit could also provide a step for the users to understand the strengths and weaknesses of various modes of communication. For example, the second step in the communication toolkit could present a matrix of the strengths and weaknesses in communication across different perspectives. For our Q methodology study, we can observe at least 21 modes of communication from across six perspectives, in the situation where communication takes place across two perspectives (assuming two-way communication). Table A.2 demonstrates how the toolkit could present 21 modes of strengths and weaknesses for communication across the six perspectives. To read the matrix, one starts with the perspective types in the row header and pick a perspective type in the column

header (i.e. Type1-Type1; Type 1-Type 2). The corresponding cell describes the strengths and weaknesses of communication between the two perspective types.

	Type 1: System Revolutionists	**Type 2: Collaborators**	**Type 3: Public Educators**	**Type 4: Debaters**	**Type 5: Strategists**	**Type 6: Technocrats**
Type 1	Potentials in drawing up centralized approaches Systemic change requires tremendous time	Potentials in achieving balance between top-down & bottom-up approaches Risks in discords regarding SD Type 2 stakeholder being more active in communication	Consensus in creating 'social switch' Conflicts in drawing up regulations versus incentives Needs a mediator to facilitate communication: both downplaying communication	Consensus in a new SD model Danger of being too fatalistic (both being pessimists) Needs a mediator to facilitate communication: both downplaying communication	Consensus in seeing SD from a macro perspective Conflicts in strategic versus systematic approaches Type 5 stakeholder being more active in communication	Potential in working on a new growth model from a systematic approach Risks of excluding non-experts Type 6 stakeholder being more active in communication
Type 2		Ground level initiatives happen faster than systematic change Risks of assuming that people want to be engaged Gap between individual and collective change	Potentials in bottom-up public engagement models Discords in types of incentives Type 2 stakeholder being more active in communication	Potentials in assessing risks in a collaborative manner Conflicts in drawing up engagement strategies Type 2 stakeholder being more active in communication	Potentials for robust communication Danger of neglecting other possible SD approaches Both stakeholders equally active in communication	Potentials in Cleantech and innovation Conflicting views on bottom-up versus top-down approaches Both stakeholders equally active in communication
Type 3			Potentials in bottom-up public engagement models Risks in targeting the 'public' as a whole- needs different messages	Potentials in assessing risks in a collaborative manner Danger of being too fatalistic Needs a mediator to facilitate communication: both downplaying communication	Potentials in drawing up strategic public engagement incentives Conflicts in opposite views regarding communication Type 5 stakeholder being more active	Potentials in drawing up incentives for the public with economic benefits Conflicting views on bottom-up versus top-down approaches Type 6 stakeholder being more active
Type 4				Ability to recognize potentials and risks Danger of focusing overly on SD discourses rather than solutions Danger of having incoherent approaches	Type 5 perspective answers to challenges raised by Type 4 stakeholders: holistic approach Type 5 stakeholder being more active in communication	Potentials in Cleantech and innovation Conflicts in multiple versus single SD solution Type 6 stakeholder being more active in communication
Type 5					Activist in facilitating	Potentials in drawing up strategic

	stakeholder communication Danger of assuming the communication approach would provide solutions to contested issues in SD	communication messages Conflicts in integrative versus single approach in SD dimensions Both stakeholders equally active
Type 6		Very focused approach, effective in allocating resources and aligning the communication message Danger of returning to status quo if new growth model fails

Table A.2 The potentials and risks in communication across six types of perspectives

Again, we emphasize that this matrix merely offers an idea of how a toolkit could illustrate the modes of communication between different perspectives. Since stakeholders are not going to have 'fixed' roles in communication around sustainable development, it is then essential to make the toolkit as flexible as possible. To avoid the danger of offering dogmatic models and solutions, future design of the toolkit could also focus on the interconnections and interdependencies of the perspectives and seek optimal, visually pleasant graphical designs for capturing and representing the complexities of the perspectives, instead of using a matrix.

A.2.3 Strategizing communication across six types of perspectives

As mentioned in one of the requirements for the communication toolkit, the toolkit could also offer several strategies in communication around sustainable development. To strategize communication around sustainable development, we suggest that further studies could be carried out to examine and evaluate the following proposed guidelines:

- ***Identify the goals and environments of communication***

  Identify the goals and environments for different types of settings for policy making, formal and informal education in the public sphere, engineering projects, lobbying & campaigns; identify the scale of interaction (i.e. active versus passive); identify the frequency and intensity of communication; identify the communication objectives (i.e. consensus building, persuasion, promotional communication).

- ***Identify specific roles for stakeholders***

  Identify the roles in communication for each stakeholders. For example, stakeholders associated with Type 1 (systemic revolution) perspective might take up the role similar to a policy maker; those who associate with Type 2 (multidisciplinary collaboration) might take up the role similar to a coordinator; those who associate with Type 3 (public mobilization) might take up the role similar to an activist; those who associate with Type 4 (fatalistic debates) might take up the role similar to a knowledge provider; those who associate with Type 5 (strategic communication) might take up the role similar to a facilitator; those who associate with Type 6 (technocratic environmentalism) might take up the role similar to a innovator. Workshops, seminars, roundtables could be organized to observe the dynamics of how different roles interact with each other; identify conflicts and mutual interests.

- ***Eliminate conflicting interests: collaborative coping strategies (Roberts 2000)***

  Reduce uncertainties by ensuring a balanced flow of knowledge exchange; identify types of strategies: support, engage, educate, coordinate; manage different expectations by recognizing complexities; evaluation of the communication impacts through: networking activities, dialogues and training.

To conclude, in this Appendix A, we present the requirements, example and descriptions of what the toolkit should look like, supported by participants' feedback discussions. We argue that this is an unique part of our study, since the toolkit offer huge potential for a segue into the practical implications from our Q methodology study and empirical analyses. To actualize the communication toolkit, future studies are needed to further investigate how various stakeholder theories and communication theories contribute to the multidisciplinary studies of sustainable development and stakeholders; more case studies could contribute to refining the criteria for the toolkit. Collaborations with designers and researchers could contribute to the designs of the toolkit and building a potential (online) database for stakeholder perspectives around sustainable development.

Appendix B: Plain Language Statement & Informed Consent Form

I. Introduction to the Research Study

The study in which you are being requested to participate has the working title of 'Stakeholder communication in sustainable development: a Q methodology study'. It is being conducted by Chao-Ping (Pat) Hong, a PhD student in the School of Communications, in DCU.

II. Details of what involvement in the Research Study will require

The study consists of two parts: Q study and results feedback. During the Q study, participants are asked to sort 55 statements, followed by a short face-to-face interview. The researcher records the interview with audio tape. 10 months after the Q study, the researcher visits the participants and discusses with them the results.

III. Potential risks to participants from involvement in the Research Study

There are no potential risks for participants in the involvement of this study.

IV. Benefits (direct or indirect) to participants from involvement in the Research Study

Participants will benefit from this study regarding the communication opportunities and challenges in sustainable development.

V. Advice as to arrangements to be made to protect confidentiality of data, including that confidentiality of information provided is subject to legal limitations

Every effort will be made to respect participants' anonymity. The data collected will be analyzed by the principal researcher alone. Participants' actual names will be protected and numbers (i.e. participant #1, participant #28) will be used if direct references are required. Interview notes and/or transcripts will be held by the principal researcher and stored in a secure location.

VII. Involvement in the Research Study is voluntary

Participants may withdraw from the Research Study at any point before the completion of the study.

If participants have concerns about this study and wish to contact an independent person, please contact:

The Secretary, Dublin City University Research Ethics Committee, c/o Research and Innovation Support, Dublin City University, Dublin 9. Tel 01-7008000

I. **Research Study Title**

The study in which you are being requested to participate has the working title of 'Stakeholder communication in sustainable development: a Q methodology study'. It is being conducted by Chao-Ping (Pat) Hong, a PhD student in the School of Communications, in DCU.

II. **Clarification of the purpose of the research**

Stakeholder communication facilitates three core dimensions of sustainable development: environmental, societal, and economical dimensions. The study investigates perspectives of stakeholders in Ireland regarding sustainable development with Q methodology.

III. **Confirmation of particular requirements as highlighted in the Plain Language**

As stated in the Plain Language Statement, participants in this research are requested to participate in a Q study, which consists of a sorting process, followed by a short face-to-face interview. The researcher records the interview with audio. Following the Q study, stakeholders are invited for an informal session of results feedback and a survey.

I have read the Plain Language Statement (or had it read to me)	Yes/No
I understand the information provided	Yes/No
I have had an opportunity to ask questions and discuss this study	Yes/No
I have received satisfactory answers to all my questions	Yes/No
I am aware that my interview during the Q study is audio-taped	Yes/No

IV. **Confirmation that involvement in the research study is voluntary**

Participants' involvement in this study is totally voluntary. As a participant you may withdraw from the Research Study at any point before all stages of the Research Study have been completed.

V. Arrangements to protect confidentiality of data

Every effort will be made to respect participants' anonymity. The data collected will be analyzed by the principal researcher alone. Participants' actual names will be protected and numbers (i.e. participant #1, participant #28) will be used if direct references are required. Interview notes and/or transcripts will be held by the principal researcher and stored in a secure location.

VI. **Signature**

I have read and understood the information in this form. My questions and concerns have been answered by the researchers, and I have a copy of this consent form. Therefore, I consent to take part in this research project.

Participant's Signature: _____

Name in Block Capitals: _____

Researcher's Signature: _____

Date: _____

Appendix C: Invitations to Participants

Invitation to semi-structured interviews

Subject: Chao-Ping (Pat) Hong would like to invite you to discuss the topic of stakeholder communication in sustainable development

Dear [Participant's name],

This is Chao-Ping Hong, PhD researcher on 'Stakeholder communication in sustainable development' at DCU, a collaborative project between the Science & Technology department and the Communication department. I've started this PhD research project about a month ago and I've learned from my colleagues that you have expressed some interests in this research project.

Thus it would be really great if you would be available sometime in the coming weeks for an interview/chat (approx. 40 minutes) to discuss some of your perspectives on sustainability in Ireland future, and I would be very happy to share with you the planning and structure of my research. I'm certain that this research will also contribute to your organization/institution.

Thank you for reading this email and hope to hear from you soon!

Kind Regards,

Chao-Ping (Pat) Hong

Invitation to Q methodology study

Subject: Chao-Ping (Pat) Hong would like to invite you to participate in a Q study: stakeholder communication in sustainable development

Dear [participant's name],

This is Chao-Ping (Pat) Hong, PhD from DCU. I'd like to invite you to take part in my Q method study. I'm using an original and interactive Q-method to investigate 'stakeholder

communication in sustainable development' in Ireland. It takes approx. 45 minute to participate in the Q-method, which involves an interactive card-sorting process.

If you are free for a 45min Q method interview please let me know! Your perspectives would add a lot to the project. Thanks for reading the email and looking forward to hearing from you soon!

Best regards,

Chao-Ping (Pat) Hong

Invitation to Q methodology study results participants' feedback

Subject: Chao-Ping (Pat) Hong would like to share with you in person the final results of the Q study: stakeholder communication in sustainable development

Dear [participant's name],

This is Chao-Ping (Pat), PhD researcher at DCU. Thank you again for participating in my Q study last year. After running an in-depth analysis of the Q study, I've got the final results. They show 6 stakeholder types: each offering a different perspective on the challenges and solutions in sustainable development in Ireland. I've also designed a matrix offering communicating guidelines for different types of stakeholders.

I'd very much to share with you and explain the final results in person, and also get some feedback from you. Please let me know if you have time for a 20 minutes chat in the coming weeks. I'm confident that the results would add to your area of expertise, and provide you with the opportunities and barriers for communicating to other types of stakeholders regarding sustainable development.

Looking forward to hearing from you soon!

Best regards,

Chao-Ping (Pat) Hong

Appendix D: Semi-structured interview questions

Topic 1: Broad definitions of sustainable development

What is your own definition of sustainable development?

What is sustainability to you?

What do you think are the dimensions in sustainable development?

Topic 2: Sustainable development agendas

What are the sustainable development actions in your organization/institution?

Topic 3: The Green Way

What is your role in *The Green Way*?

What are your expectations of *The Green Way*?

Topic 4: Scientific and societal issues in sustainable development

What do you think are the major scientific issues around sustainable development?

What do you think are the major societal issues around sustainable development?

Topic 5: Communication around sustainable development

What do you think are the opportunities regarding communication around sustainable development?

What do you think are the barriers regarding communication around sustainable development?

What are the benefits in collaboration with other stakeholders?

What are the barriers in collaboration with other stakeholders?

Appendix E: Interview Questions for Participants' Feedback on the Q Methodology Study Results

How do you find yourself associated with each type of perspective?

Do you find yourself associated with your own Q results? Why or why not?

Do you feel that the analysis reflect the current stakeholder perspectives of the various problems, challenges, and solutions in sustainable development in Ireland?

Do you want to add anything, or point out that a type of perspective is not accurate or recognisable?

Change of viewpoint: one year has gone by since you participated in the Q study, why or why not your perspective has changed on sustainable development?

Could you please discuss the opportunities for effective communication in sustainable development, as evident from the analysis?

Could you please discuss challenges of communication in sustainable development from the analysis?

Could you please discuss your viewpoints on the requirements for a stakeholder communication toolkit for sustainable development in Ireland?

Any questions? Anything else that you would like to add?

Appendix F: Preselected Statements in the Q Concourse

Statements	Theoretical Codes
1 Ireland should develop more inclusive and participative processes of communication practices to enhance dialogues between stakeholders and support reflections on the challenges of complex and wicked problems* in sustainable development in Ireland. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)	Stakeholder collaboration in sustainable development
2 The growth of Cleantech in Ireland will bring forth opportunities into the agenda of sustainable development as well as implications for society, policy, institutions, and organizations.	Cleantech and economic-driven sustainable development agenda
3 In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated, with a framework to evaluate the success of communication.	Stakeholder collaboration in sustainable development sustainable development communication guidelines
4 Ireland needs to develop new grounds and models for the empowerment of public participation and engagement in science as well as the constraints.	Inclusive, bottom-up approach
5 In Ireland, there is a lack of consideration for a holistic overview of dimensions (environmental, economical and societal) in drawing up sustainable development approaches.	Holism of sustainable development

6 Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life, and receives much attention from policy makers, industry, the public and NGOs.	Inclusive, bottom-up approach
7 Stakeholders have polarized views on solutions and practices in sustainable development in Ireland.	sustainable development communication strategies are tailor-made
8 The traditional definition of sustainable development according to Brundtland (''development that meets the needs of the present without compromising the ability of future generations to meet their own needs'') is an oxymoron because it fails to address tangible, smaller-scale problems, which require more consistent, pragmatic, and realistic approaches.	Vagueness in sustainable development definitions
9 The challenge for sustainable development in Ireland is to develop a balanced framework specific enough for an empirical analysis and at the same time universal enough to accommodate various dimensions, such as enhancement of the science-policy interface.	Systemic approach
10 The complexity of sustainable development issues in Ireland makes evaluating and communicating the concept difficult.	Holism of sustainable development
11 Sustainable development concept attempts to cover too much and every single entity of environmental and socio-economic issues. For example, the relationship between people and environment, economic growth and inequity.	Vagueness of sustainable development

12 In Ireland, there seems to be no single, unified philosophy of sustainability, due to the fact that the major discourse is presently being dominated by 'the managerial outlook'.	Economic-driven sustainable development agenda
13 In the mainstream debate of sustainable development in Ireland, the cultural definitions are often overlooked due to the dominance of the science paradigm.	Inclusive, bottom up approach
14 In Ireland, sustainable development issues are wicked problems*, with ill-defined social controversies, various discourses with ontological differences. (*wicked problems are problems where there are complexities in multiple causes, consequences, and multi-actors)	Holism of sustainable development
15 Sustainable development can also be viewed as a scientific and technological endeavour. Science and technology are amongst the most effective means to enhance growth and socio-economic development in Ireland.	Cleantech and economic-driven agenda
16 Scientific and technological debates often result in a polarized public: those who simply accept the autonomy of technology development and trust the decisions made by 'experts', against those who are sceptical and suspicious of technologies and innovations.	sustainable development communication are tailor- made
17 In Ireland, people often respond to scientific issues only when there is an urgent problem which involves the 'consequentiality' of science. For example, implications of a new technology, or significant issues	sustainable development solutions are tailor-made

regarding health risks or uncertainties (i.e. nanotechnology, GM food).	
18 Cleantech, or clean technology, is an essential endeavor to achieve sustainability, as ''going green is the largest economic opportunity of the 21st century''. The growth of Cleantech in Ireland will bring forth many advantages, including the generation of opportunities in reduction of costs in energy production with innovation, while simultaneously creating 'green-collar' jobs.	Cleantech and economic-driven agenda
19 In the financial crisis, a focus on the green economy could be an important tool to restore economic stability in Ireland and enhance significantly the ambitions of sustainable development.	Cleantech and economic-driven agenda
20For Ireland, it is essential that Cleantech should not be used as a new buzzword. It requires fundamental shift of mindsets, technological push as well as market demand.	Cleantech and economic-driven agenda
21 In Ireland, people don't like new things and they are afraid of changes. Therefore, the challenge of the social aspect in sustainable development is that it is very hard to mobilize the public due to their 'defence mechanism', unless they receive 'benefits' in some forms.	Inclusive, bottom up approach
22 A lot of Irish organizations/corporations are using sustainability for 'greenwashing'. Even though they are doing something to help the environment as well, sustainability is not the main driver.	Greenwashing

23 In Ireland, one of the problems with communication between different disciplines is that people use jargons that are very specific to their discipline.	Tailor-made sustainable development communication strategies
24 In the discussion of benefits for a new technology, it is essential to incorporate the impacts, the complete life-cycle into consideration as well as comparisons of different technologies.	Interaction between sustainable development theories and practices
25 In Ireland, to mobilize people into sustainable behaviours/activities, motivational tools such as creating incentives, showing them how easy it could be done, and also peer-led initiatives are useful.	Inclusive, bottom up approach
26 By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.	Inclusive, bottom up approach
27 In organizing sustainability activities for Irish communities, it is very important to create linkages between inter-generational age groups.	Stakeholder collaboration in sustainable development
28 It is easy to see what the short-term effects are on people's behavioral change regarding sustainability, but more difficult to monitor and evaluate effects on a longer term.	Holism of sustainable development
29 The NGOs sector in Ireland has a huge amount of expertise and knowledge to offer for sustainable development.	Stakeholder collaboration in sustainable development
30 The sustainable development agenda in Ireland should represent all levels, including social partnership, local authority structures and procurements, etc.	Stakeholder collaboration in sustainable development

31 Sustainable development is about value judgment, about how humans interact with the nature in relation to human needs and humanities.	Holism of sustainable development
32 In the current system, it is hard to see environmental impacts in comparison to economical growth, since Ireland is adopting a singular focus on GDP as a measure of success for sustainable development, whereas the impacts of preservation for the nature appears more 'invisible'.	Interaction between sustainable development theories and practices
33 The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global sustainable development strategies such as Rio 20+, etc.	Systemic, expert-driven approach
34 Ireland is wealthy in terms of resources, but as a developed country, the general public is immune to the natural resources, food and the impacts of nature on their lives.	Inclusive, bottom up approach
35 The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.	Tailor-made sustainable development communication strategies
36 There is a huge gap between attitudes/awareness towards sustainability and sustainable behaviors in Ireland. That is, people are aware of sustainability related issues but often fail to act sustainably.	Interaction between sustainable development theories and practices
37 Although individual contributions are fruitful in creating a sustainable environment, it is policy at the	Systemic, expert-driven approach

national level (or even at the international level) that's going to create real impacts. This implies that in Ireland, people are more willing to conduct sustainable actions collectively than individually.	
38 In Ireland, pushing for environmental bills and policies requires tremendous effort in terms of time in proceeding through the public consultation process.	Systemic, expert-driven approach
39 In Ireland, it is very difficult to find the language that delivers effective impact in sustainable development endeavors, especially with economy being the 'currency' for policy, and sustainable development being viewed in Ireland as an ultimate issue of sustainable economic growth.	Tailor-made sustainable development communication strategies
40 There's a challenge in technology adoption in Ireland, in which the current system tends to fall into flavour with the current technology, and consequently hinder the introduction and transition of new technology.	Tailor-made sustainable development solutions
41 In Ireland, social transparency or social equity are not present to enable certain measures to take place in sustainable development.	Tailor-made sustainable development solutions
42 Collaboration in sustainable development is difficult in the sense that it doesn't fit into a neat little box for stakeholders from different sectors.	Stakeholder collaboration in sustainable development
43 In communication about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.	Strategic communication in sustainable development

44 The biggest challenge in sustainability is how to stimulate 'real' behaviour as oppose to changing attitude since changing attitudes does not necessarily leads to changing behaviours.	Interaction between sustainable development theories and practices
45 When evaluating the success of sustainable development, not only the individual level has to be evaluated but also the overall system, since individual efforts might be sustainable but not on the broader level.	sustainable development communication guidelines
46 The term 'sustainability' or 'sustainable development' used by environmentalists, governments, politicians, industries and the business show very diverse visions of how the different pillars of sustainable development could be married together for different stakeholders in Ireland.	Holism of sustainable development
47 Communication around sustainable development issues in Ireland requires an establishment of communication strategies to enhance social expectations and multiple negotiation processes between stakeholders.	Strategic communication in sustainable development
48 Adopting complexities in various modalities of communication where different viewpoints co-exist to accommodate different objectives and target groups could be very useful in dealing with a variety of values at stake in a strategic decision-making process regarding sustainable development in Ireland.	Strategic communication in sustainable development
49 Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders, fostering innovative communication	Stakeholder collaboration in sustainable development

approaches with citizens, stakeholders, city partners and adjoining authorities in a social learning, adaptive, and co-evolving environment.	
50 Most scientific approaches in sustainable development are obvious to the public in Ireland (i.e. the natural steps, the carbon, strategic approach, backcasting, etc). However, the social aspects of sustainable development, such as values, cultures, are more difficult for them to grasp.	Interaction between sustainable development theories and practices
51 In Ireland, the challenge for carrying out sustainable development is that we are never at the right time or we never have enough time to sit down and say what our values are, and what the most important thing is for our society.	Tailor-made sustainable development solutions
52 It is wrong to assume that everyone in Ireland wants sustainability since people have different priorities and they weigh the benefits and costs of sustainability.	Tailor-made sustainable development communication strategies
53 In Ireland, there's a movement towards resilience, towards community bargains, towards collective transitions regarding sustainability actions.	Inclusive, bottom up approach
54 The Irish government is not communicating clearly and coherently to the people regarding the level of the priorities of sustainable development issues, nor the actions that people should take.	Strategic communication in sustainable development
55 Framing sustainable development models together with economic arguments is much easier than accommodating complexities and consequences from	sustainable development communication guidelines

evaluating and gauging developments in the areas of science and technology.	
56 Sustainable development models in Ireland should not remain merely top-down and expert-driven. Rather, a more inclusive and transparent operationalized and institutional process should be adopted.	Inclusive, bottom up approach
57 People react to sustainable issues most relevant to them, for example community sustainable and ecological activities, and do not respond to the more abstract notion of sustainability.	Tailor-made sustainable development communication strategies
58 Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainability issues and how they are incorporated in policies and operations.	Greenwashing
59 The current Irish political economic system would not be able to achieve the targets in sustainable development, due to the lack of motivations for traditional bureaucracies to learn from past experiences and admit failures.	Interaction between sustainable development theories and practices
60 Despite the attempts to integrate the three dimensions (economic, environmental and social pillars), which might appear compatible in theory, it proves to be inapplicable in practice.	Interaction between sustainable development theories and practices
61 Endeavors in communication around sustainable development are inadequate in accommodating multi-dimensional perspectives, and lacking in stakeholders' consensus regarding assimilative	sustainable development communication guidelines

capacity, especially when complex systems such as socio-cultural and environmental ones collide.	
62 In Ireland, media catchwords on sustainability-related topics might be too simple and misleading, and do not provide meaningful insights for policy making process.	Strategic communication in sustainable development
63 Ireland should 'shift the leadership focus from policy makers to market shapers', making sustainable marketing an open process.	Tailor-made solutions
64 The biggest challenge in communicating sustainability lies in the translation of concepts into practices, and also the implementation of sustainability strategies with a clear understanding of the implications and linkages between the drivers and impacts on a broad set of stakeholders.	Interaction between sustainable development theories and practices
65 The Irish government and officials often speak of scientific evidences as separate values from the concerns from the public, with science and technology often used as merely an instrumental tool for drawing up policies, and using dominant models of science to maintain the dichotomy of science and values.	Holism of sustainable development
66 Stronger commitment to reinforce understanding of sustainability and cooperation between local communities and the Irish government is needed.	Stakeholder collaboration in sustainable development
67 The lack of consensus is a major impediment for intergroup dialogues, when communication about sustainable development requires the clear identification of the positions of the stakeholder groups within some broad framework.	Stakeholder collaboration in sustainable development

68 There's a need to shift from the current mindset of energy security towards a climate security, and that R&D collaboration of different sectors in providing solutions is required.	Stakeholder collaboration in sustainable development
69 In communication around sustainable development, it is essential to identify the 'champions', the ones who are enthusiastic in creating strategic opportunities and changes for Ireland.	sustainable development communication guidelines
70 Sustainable development impacts in Ireland are more effective when it is regulation-driven.	Systematic, expert-driven approach
71 Ireland is not working out how its economy can serve in a sustainable fashion at all. The conversations are only about 'getting back to growth'. This will only solve some of the problems in the economical and social area, but not the environmental one.	Holism of sustainable development
72 The environmental and economic pillars in sustainable development are very disconnected at this moment in Ireland - the overlapping parts are missing, even more missing than it has been in the past.	Holism of sustainable development
73 To create awareness of sustainability in Ireland, there should be an 'outlook' to show people that they are responsible for the environment.	Strategic communication in sustainable development
74 Sustainable development is developments that slow down consumption and degradation, and it's not GDP development.	Holism of sustainable development
75 The challenge in the societal part of sustainable development is that we have to move a gigantic market, a gigantic perception, from fossil fuel to alternatives. It is thus difficult to make people	Tailor-made sustainable development solutions

understand that solutions are viable, and feasible, in a very short period of time.	
76 There should be more education for the general public in Ireland regarding unsustainable behaviours in order to change people's perceptions.	Tailor-made sustainable development solutions
77 It is difficult for the Irish industry to collaborate with the academic in large-scale sustainable development projects; rather, collaborations are mostly niches with specific goals.	Stakeholder collaboration in sustainable development
78 Communication between the academia and the public regarding sustainable development issues need simplification, and reduction to the core.	Strategic communication in sustainable development
79 In communicating sustainable development issues, Ireland needs voices from NGOs or activist groups as communication liaisons between the academic, industry, public authorities and the general public.	Stakeholder collaboration in sustainable development
80 It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those with interests.	Strategic communication in sustainable development
81 There should be some communication guidelines or protocols for every discipline to communicate effectively about sustainable development issues.	sustainable development communication guidelines
82 Ireland should market itself as a 'green' island.	Strategic communication in sustainable development
83 Everything else would fall through successfully once the economic dimension in sustainable development is achieved in Ireland, which implies that the driver	Cleantech and economic-driven sustainable development agenda

behind sustainable development is cost and efficiency, as opposed to philanthropy.	
84 New protocols of communicating science need to be drawn up to address new, uncertain, and controversial sciences in cross-disciplinary boundaries where public interest issues are genuine and visible. This requires more public engagement in science to stimulate effective communication of science.	sustainable development communication guidelines
85 A reformation of institutional framework with a 'bottom up' structure is needed to initiate cooperation between the government and local authorities to fully embrace sustainable initiatives at local, national and international decision levels.	Inclusive, bottom-up approach
86 The most ideal communication model in sustainable development would be treating both the experts and citizens as equally crucial instruments and stakeholders in the learning and consultative process, as opposed to the exclusive, 'expert-driven' framework of decision-making process.	Stakeholder collaboration in sustainable development

Appendix G: Q Methodology Study Instructions

Participant number:

Steps:

The main purpose of the research is to understand perceptions of stakeholders in the field of sustainable development in Ireland. Q method is an interactive research method using quantitative as well as qualitative approaches to cluster and investigate patterns emerged from the data.

1. There are in total 55 cards. On each card there is a statement about sustainable development in Ireland. These statements are collected from pilot interviews with Irish experts in the field of sustainable development, along with an in-depth literature review during the period of time 2011-2012. Initially 180 statements were extracted. After a peer review process, the numbers of statements are reduced to manageable amount.

2. The task of the Q method is to rank the statements into the arrangement of the given Q score sheet. The main question here is: to which extent do you agree or disagree with the statements on the cards?

3. The sorting process starts with a rough sorting. First, read all the statements on the cards. As you are going through each one of the statement, sort them into three stacks: agree, neutral, disagree. Feel free to make comments about the statements, or ask questions if anything is not clear. Please let me know when you are finished with the rough sorting.

4. Count the number of cards in each stack and write them down in the box labelled 'agree, neutral, and disagree' on the bottom left.

5. From the stack of the **agreed** cards, pick **TWO** that you most agree with and write down the card number in the two boxes under **'11'** on the Q score sheet (it does not matter which one is on the top)

6. From the stack of the **disagreed** cards, pick **TWO** that you most disagree with and write down the card number in the two boxes under **'1'** on the Q score sheet (it does not matter which one is on the top)

7. Again, from the remaining stack of **agreed** cards, pick **THREE** that you most agree with and write down the card number in the three boxes under **'10'** on the Q score sheet (it does not matter which one is on the top)

8. Again, from the remaining stack of **disagreed** cards, pick **THREE** that you most agree with and write down the card number in the three boxes under '2' on Q score sheet (it does not matter which one is on the top)

9. Repeat the process until you have all the cards arranged as the distribution on the Q score sheet.

10. Make any final changes and make sure you have written down the card number in the boxes on the Q score sheet.

Open-ended questions:

- Why do you most agree with the two statements placed under '11'?

Statement	**Rationales**

- Why do you agree with the three statements placed under '10'?

Statement	**Rationales**

- Why do you most disagree with the two statements placed under ‘1’?

Statement	**Rationales**

- Why do you also disagree with the three statements placed under ‘2’?

Statement	**Rationales**

- Do you find anything missing from the 55 statements? Is there anything that you would like to add?

- Can you reflect on the process of the Q sorting? What do you think of the method?

- Do you have in mind any experts in the field of sustainable development who would be interested to take part in this method?

Additional questions:

- In your own words, what do you think is sustainable development?
- What do you think Ireland needs the most to achieve sustainable development?
- Which aspect/dimension of sustainable development would you regard a priority for Ireland?
- What do you think about collaboration/interdisciplinary communication in Ireland?
- What do you think is the most challenging/barrier in communication about sustainable development?

Least in accordance with my opinion		Q Score Sheet		Most in accordance with my opinion

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5

Appendix H: Crib Sheets for Four-factor Solution

Factor 1: #6, #10, #11, #16, #20, #24; 13%

Items ranked at +5

*20(+5) There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably.

23(+5) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.

Items ranked at +4

*24(+4) Although individual contributions are fruitful in creating a sustainable environment; it is policy at the national or international level that's going to create real impacts.

*28(+4) In Ireland, the challenge for carrying out sustainable development is that there is not enough time to sit down and discuss what the most important values should be for the society.

47(+4) Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.

Item Ranked Higher in Factor 1 Array than in other Arrays

03(0) Stakeholders have polarized views on solutions and practices in sustainable development in Ireland.

04(+1) In Ireland, the major discourse of sustainable development is currently being dominated by 'the managerial outlook'.

08(+2) In the mainstream debate of sustainable development in Ireland, the societal definitions are often overlooked due to the dominance of the science paradigm.

09(+1) Sustainable development can also be viewed as a scientific and technological endeavour. Science and technology are amongst the most effective means to enhance socio-economic development in Ireland.

10(+3) Cleantech is an essential endeavor to achieve sustainability. The growth of Cleantech in Ireland will bring forth many opportunities, including energy, innovation, and 'green-collar' jobs.

11(+2) A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver.

13(+2) Scientific and technological debates often result in a polarized public: those who simply accept new technologies and trust the decisions made by 'experts', against those who are suspicious of innovations.

32(+1) Not everyone in Ireland wants sustainability since people have different priorities.

37(+2) The Irish government is not communicating clearly and coherently to the people the priorities of sustainable development issues.

©39(-2) Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainable policies and operations.

40(+1) In Ireland, media catchwords on sustainability-related topics are too simple and misleading, and do not provide meaningful insights for sustainable development.

42(-1) The Irish government often regards science and technology merely as an instrumental tool for drawing up sustainable development policies.

49(+3) The challenge in the societal part of sustainable development is that we have to move a gigantic market from fossil fuel to alternatives. It is difficult to make people understand in a very short period of time that solutions are feasible.

Item Ranked Lower in Factor 1 Array than in other Arrays

02(+1) Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches.

07(-3) The complexity of sustainable development issues in Ireland makes communicating the concept of sustainable development difficult.

12(-3) By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.

16(-3) It is easy to see the short-term effects on behavioral change regarding sustainability, but more difficult to monitor and evaluate effects on a longer term.

17(-1) The NGOs sector in Ireland has a huge amount of expertise and knowledge to offer for sustainable development.

21(-1) The sustainable development agenda in Ireland should represent all levels, including social partnership, local authorities and procurements.

©22(0) The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.

27(0) The term 'sustainability' or 'sustainable development' used by environmentalists, governments, politicians, industries and the business show very diverse visions.

29(-1) It is very difficult to find the language that delivers effective impact in sustainable development endeavors, especially with economy being the 'currency' for policy.

30(-1) In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.

*31(0) Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders to foster communication.

38(+1) Sustainable development models in Ireland should not remain merely top-down and expert-driven. Rather, a more inclusive and transparent process should be adopted.

41(-3) Ireland should shift the leadership focus from policy makers to market shapers, making sustainable marketing an open process.

44(-2) The environmental and economic pillars in sustainable development are very disconnected at this moment in Ireland - the overlapping parts are missing, even more missing than it has been in the past.

45(0) One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders.

46(-1) In communication around sustainable development, it is essential to identify the 'champions', the ones who are enthusiastic in creating strategic opportunities and changes for Ireland.

55(-1) New protocols of communicating science need to be drawn up to address controversial scientific issues in cross-disciplinary fields.

Items ranked at -4

06(-4) Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.

36(-4) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

*52(-4) The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.

Items ranked at -5

51(-5) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

54(-5) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.

Factor 2: #2, #4, #7, #14, #23, #26 ; 12%

Items ranked at +5

45(+5) One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders.

53(+5) There should be more education for the general public in Ireland regarding sustainable development.

Items ranked at +4

01(+4) There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)

*21(+4) The sustainable development agenda in Ireland should represent all levels, including social partnership, local authorities and procurements.

*48(+4) Sustainable development should not be GDP development.

Item Ranked Higher in Factor 2 Array than in other Arrays

06(-3) Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.

18(+2) Sustainable development is about value judgment, about how humans interact with the nature to address human needs.

27(+2) The term 'sustainability' or 'sustainable development' used by environmentalists, governments, politicians, industries and the business show very diverse visions.

31(+3) Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders to foster communication.

32(+1) Not everyone in Ireland wants sustainability since people have different priorities.

33(-1) In Ireland, there's a movement towards resilience and collective transitions in sustainable actions.

34(+1) Framing sustainable development with economic arguments is much easier than accommodating complexities in science and technology.

35(+2) People react to sustainable issues most relevant to them, for example green community/campus activities. They do not respond to the more abstract notion of sustainability.

©39(-2) Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainable policies and operations.

41(-1) Ireland should shift the leadership focus from policy makers to market shapers, making sustainable marketing an open process.

*43(0) Sustainable development initiatives in Ireland are more effective when they are regulation-driven.

46(+2) In communication around sustainable development, it is essential to identify the 'champions', the ones who are enthusiastic in creating strategic opportunities and changes for Ireland.

*51(-3) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

Item Ranked Lower in Factor 2 Array than in other Arrays

02(+1) Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches.

04(-2) In Ireland, the major discourse of sustainable development is currently being dominated by 'the managerial outlook'.

09(-2) Sustainable development can also be viewed as a scientific and technological endeavour. Science and technology are amongst the most effective means to enhance socio-economic development in Ireland.

11(0) A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver.

*13(-2) Scientific and technological debates often result in a polarized public: those who simply accept new technologies and trust the decisions made by 'experts', against those who are suspicious of innovations.

©22(0) The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.

23(+1) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.

25(-1) In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.

42(-3) The Irish government often regards science and technology merely as an instrumental tool for drawing up sustainable development policies.

47(+1) Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.

50(-2) In Ireland, it is difficult for the industry to collaborate with the academic in large-scale sustainable development projects; rather, collaborations are mostly niches with specific goals.

55(-1) New protocols of communicating science need to be drawn up to address controversial scientific issues in cross-disciplinary fields.

Items ranked at -4

08(-4) In the mainstream debate of sustainable development in Ireland, the societal definitions are often overlooked due to the dominance of the science paradigm.

14(-4) In Ireland, people don't like new things and they are afraid of changes. It is very hard to mobilize the public to act sustainably due to their 'defence mechanism', unless they receive 'benefits' in some forms.

36(-4) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

Items ranked at -5

*19(-5) Ireland is wealthy in terms of resources, but as a developed country, the general public is immune to environmental impacts.

54(-5) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.

Factor 3: #3(-ve), #25; 5%

Items ranked at +5

38(+5) Sustainable development models in Ireland should not remain merely top-down and expert-driven. Rather, a more inclusive and transparent process should be adopted.

*52(+5) The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.

Items ranked at +4

*02(+4) Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches.

26(+4) In Ireland, social transparency or social equity are not present in sustainable development.

47(+4) Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.

Item Ranked Higher in Factor 3 Array than in other Arrays

05(+2) In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.

12(+1) By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.

16(+3) It is easy to see the short-term effects on behavioral change regarding sustainability, but more difficult to monitor and evaluate effects on a longer term.

17(+2) The NGOs sector in Ireland has a huge amount of expertise and knowledge to offer for sustainable development.

19(0) Ireland is wealthy in terms of resources, but as a developed country, the general public is immune to environmental impacts.

©22(+2) The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.

31(+3) Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders to foster communication.

*36(+1) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

50(0) In Ireland, it is difficult for the industry to collaborate with the academic in large-scale sustainable development projects; rather, collaborations are mostly niches with specific goals.

54(+2) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.

55(+2) New protocols of communicating science need to be drawn up to address controversial scientific issues in cross-disciplinary fields.

Item Ranked Lower in Factor 3 Array than in other Arrays

03(-2) Stakeholders have polarized views on solutions and practices in sustainable development in Ireland.

07(-3) The complexity of sustainable development issues in Ireland makes communicating the concept of sustainable development difficult.

09(-2) Sustainable development can also be viewed as a scientific and technological endeavour. Science and technology are amongst the most effective means to enhance socio-economic development in Ireland.

11(0) A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver.

15(+1) In Ireland, to mobilize people into sustainable activities, motivational tools such as creating incentives, showing them how easy it could be done, or community initiatives could be useful.

*20(-1) There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably.

23(+1) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.

25(-1) In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.

30(-1) In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.

32(-1) Not everyone in Ireland wants sustainability since people have different priorities.

34(-2) Framing sustainable development with economic arguments is much easier than accommodating complexities in science and technology.

35(0) People react to sustainable issues most relevant to them, for example green community/campus activities. They do not respond to the more abstract notion of sustainability.

*37(-1) The Irish government is not communicating clearly and coherently to the people the priorities of sustainable development issues.

©39(-3) Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainable policies and operations.

40(-2) In Ireland, media catchwords on sustainability-related topics are too simple and misleading, and do not provide meaningful insights for sustainable development.

41(-3) Ireland should shift the leadership focus from policy makers to market shapers, making sustainable marketing an open process.

49(-1) The challenge in the societal part of sustainable development is that we have to move a gigantic market from fossil fuel to alternatives. It is difficult to make people understand in a very short period of time that solutions are feasible.

53(-1) There should be more education for the general public in Ireland regarding sustainable development.

Items ranked at -4

06(-4) Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.

10(-4) Cleantech is an essential endeavor to achieve sustainability. The growth of Cleantech in Ireland will bring forth many opportunities, including energy, innovation, and 'green-collar' jobs.

24(-4) Although individual contributions are fruitful in creating a sustainable environment; it is policy at the national or international level that's going to create real impacts.

Items ranked at -5

*43(-5) Sustainable development initiatives in Ireland are more effective when they are regulation-driven.

51(-5) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

Factor 4: #1, #8, #9, #12, #13, #17, #18, #19, #20, #21; 15%

Items ranked at +5

23(+5) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.

*30(+5) In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.

Items ranked at +4

15(+4) In Ireland, to mobilize people into sustainable activities, motivational tools such as creating incentives, showing them how easy it could be done, or community initiatives could be useful.

20(+4) There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably.

45(+4) One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders.

Item Ranked Higher in Factor 4 Array than in other Arrays

03(0) Stakeholders have polarized views on solutions and practices in sustainable development in Ireland.

*07(+1) The complexity of sustainable development issues in Ireland makes communicating the concept of sustainable development difficult.

*14(+2) In Ireland, people don't like new things and they are afraid of changes. It is very hard to mobilize the public to act sustainably due to their 'defence mechanism', unless they receive 'benefits' in some forms.

19(0) Ireland is wealthy in terms of resources, but as a developed country, the general public is immune to environmental impacts.

25(+1) In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.

29(+1) It is very difficult to find the language that delivers effective impact in sustainable development endeavors, especially with economy being the 'currency' for policy.

35(+2) People react to sustainable issues most relevant to them, for example green community/campus activities. They do not respond to the more abstract notion of sustainability.

37(+2) The Irish government is not communicating clearly and coherently to the people the priorities of sustainable development issues.

©39(-2) Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainable policies and operations.

42(-1) The Irish government often regards science and technology merely as an instrumental tool for drawing up sustainable development policies.

44(+3) The environmental and economic pillars in sustainable development are very disconnected at this moment in Ireland - the overlapping parts are missing, even more missing than it has been in the past.

46(+2) In communication around sustainable development, it is essential to identify the 'champions', the ones who are enthusiastic in creating strategic opportunities and changes for Ireland.

Item Ranked Lower in Factor 4 Array than in other Arrays

01(0) There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)

02(+1) Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches.

04(-2) In Ireland, the major discourse of sustainable development is currently being dominated by 'the managerial outlook'.

05(0) In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.

11(0) A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver.

*18(-3) Sustainable development is about value judgment, about how humans interact with the nature to address human needs.

22(0) The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.

26(-2) In Ireland, social transparency or social equity are not present in sustainable development.

32(-1) Not everyone in Ireland wants sustainability since people have different priorities.

©33(-3) In Ireland, there's a movement towards resilience and collective transitions in sustainable actions.

34(-2) Framing sustainable development with economic arguments is much easier than accommodating complexities in science and technology.

48(-1) Sustainable development should not be GDP development.

Items ranked at -4

28(-4) In Ireland, the challenge for carrying out sustainable development is that there is not enough time to sit down and discuss what the most important values should be for the society.

51(-4) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

Items ranked at -5

06(-5) Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.

36(-5) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

Appendix I: Crib Sheets for Five-factor Solution

Factor 1: #6, #10, #11, #12, #16, #24, #27; 8.43; 11%

Items ranked at +5

23(+5) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.

47(+5) Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.

Items ranked at +4

10(+4) Cleantech is an essential endeavor to achieve sustainability. The growth of Cleantech in Ireland will bring forth many opportunities, including energy, innovation, and 'green-collar' jobs.

20(+4) There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably.

24(+4) Although individual contributions are fruitful in creating a sustainable environment; it is policy at the national or international level that's going to create real impacts.

Items Ranked Higher in Factor 1 Array than in Other Factor Arrays

01(+3) There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)

04(+1) In Ireland, the major discourse of sustainable development is currently being dominated by 'the managerial outlook'.

05(+1) In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.

08(+2) In the mainstream debate of sustainable development in Ireland, the societal definitions are often overlooked due to the dominance of the science paradigm.

09(+2) Sustainable development can also be viewed as a scientific and technological endeavour. Science and technology are amongst the most effective means to enhance socio-economic development in Ireland.

11(+1) A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver.

13(+1) Scientific and technological debates often result in a polarized public: those who simply accept new technologies and trust the decisions made by 'experts', against those who are suspicious of innovations.

15(+3) In Ireland, to mobilize people into sustainable activities, motivational tools such as creating incentives, showing them how easy it could be done, or community initiatives could be useful.

22(+1) The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.

26(0) In Ireland, social transparency or social equity are not present in sustainable development.

28(+3) In Ireland, the challenge for carrying out sustainable development is that there is not enough time to sit down and discuss what the most important values should be for the society.

37(+2) The Irish government is not communicating clearly and coherently to the people the priorities of sustainable development issues.

40(+1) In Ireland, media catchwords on sustainability-related topics are too simple and misleading, and do not provide meaningful insights for sustainable development.

49(+3) The challenge in the societal part of sustainable development is that we have to move a gigantic market from fossil fuel to alternatives. It is difficult to make people understand in a very short period of time that solutions are feasible.

50(0) In Ireland, it is difficult for the industry to collaborate with the academic in large-scale sustainable development projects; rather, collaborations are mostly niches with specific goals.

Items Ranked Lower in Factor 1 Array than in Other Factor Arrays

07(-2) The complexity of sustainable development issues in Ireland makes communicating the concept of sustainable development difficult.

12(-3) By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.

17(-1) The NGOs sector in Ireland has a huge amount of expertise and knowledge to offer for sustainable development.

21(-1) The sustainable development agenda in Ireland should represent all levels, including social partnership, local authorities and procurements.

27(0) The term 'sustainability' or 'sustainable development' used by environmentalists, governments, politicians, industries and the business show very diverse visions.

29(-1) It is very difficult to find the language that delivers effective impact in sustainable development endeavors, especially with economy being the 'currency' for policy.

30(-1) In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.

33(-2) In Ireland, there's a movement towards resilience and collective transitions in sustainable actions.

35(0) People react to sustainable issues most relevant to them, for example green community/campus activities. They do not respond to the more abstract notion of sustainability.

39(-2) Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainable policies and operations.

41(-3) Ireland should shift the leadership focus from policy makers to market shapers, making sustainable marketing an open process.

44(-2) The environmental and economic pillars in sustainable development are very disconnected at this moment in Ireland - the overlapping parts are missing, even more missing than it has been in the past.

45(-1) One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders.

46(-1) In communication around sustainable development, it is essential to identify the 'champions', the ones who are enthusiastic in creating strategic opportunities and changes for Ireland.

55(-1) New protocols of communicating science need to be drawn up to address controversial scientific issues in cross-disciplinary fields.

Items ranked at -4

06(-4) Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.

36(-4) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

52(-4) The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.

Items ranked at -5

51(-5) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

54(-5) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.

Factor 2: #2, #4, #7, #14, #23, #28; 1.49; 11%

Items ranked at +5

45(+5) One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders.

53(+5) There should be more education for the general public in Ireland regarding sustainable development.

Items ranked at +4

18(+4) Sustainable development is about value judgment, about how humans interact with the nature to address human needs.

21(+4) The sustainable development agenda in Ireland should represent all levels, including social partnership, local authorities and procurements.

48(+4) Sustainable development should not be GDP development.

Items Ranked Higher in Factor 2 Array than in Other Factor Arrays

01(+3) There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)

05(+1) In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.

16(+3) It is easy to see the short-term effects on behavioral change regarding sustainability, but more difficult to monitor and evaluate effects on a longer term.

22(+1) The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.

40(0) In Ireland, media catchwords on sustainability-related topics are too simple and misleading, and do not provide meaningful insights for sustainable development.

43(0) Sustainable development initiatives in Ireland are more effective when they are regulation-driven.

51(-2) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

52(+3) The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.

Items Ranked Lower in Factor 2 Array than in Other Factor Arrays

02(0) Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches.

12(-3) By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.

13(-3) Scientific and technological debates often result in a polarized public: those who simply accept new technologies and trust the decisions made by 'experts', against those who are suspicious of innovations.

25(-2) In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.

39(-2) Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainable policies and operations.

40(-1) In Ireland, media catchwords on sustainability-related topics are too simple and misleading, and do not provide meaningful insights for sustainable development.

42(-2) The Irish government often regards science and technology merely as an instrumental tool for drawing up sustainable development policies.

47(+2) Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.

50(-2) In Ireland, it is difficult for the industry to collaborate with the academic in large-scale sustainable development projects; rather, collaborations are mostly niches with specific goals.

55(-1) New protocols of communicating science need to be drawn up to address controversial scientific issues in cross-disciplinary fields.

Items ranked at -4

08(-4) In the mainstream debate of sustainable development in Ireland, the societal definitions are often overlooked due to the dominance of the science paradigm.

14(-4) In Ireland, people don't like new things and they are afraid of changes. It is very hard to mobilize the public to act sustainably due to their 'defence mechanism', unless they receive 'benefits' in some forms.

19(-4) Ireland is wealthy in terms of resources, but as a developed country, the general public is immune to environmental impacts.

Items ranked at -5

36(-5) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

54(-5) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.

Factor 3: #8, #13, #17, #19; 1.54; 11%

Items ranked at +5

30(+5) In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.

44(+5) The environmental and economic pillars in sustainable development are very disconnected at this moment in Ireland - the overlapping parts are missing, even more missing than it has been in the past.

Items ranked at +4

23(+4) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.

38(+4) Sustainable development models in Ireland should not remain merely top-down and expert-driven. Rather, a more inclusive and transparent process should be adopted.

46(+4) In communication around sustainable development, it is essential to identify the 'champions', the ones who are enthusiastic in creating strategic opportunities and changes for Ireland.

Items Ranked Higher in Factor 3 Array than in Other Factor Arrays

02(+3) Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches.

05(+1) In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.

12(-1) By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.

15(+3) In Ireland, to mobilize people into sustainable activities, motivational tools such as creating incentives, showing them how easy it could be done, or community initiatives could be useful.

26(0) In Ireland, social transparency or social equity are not present in sustainable development.

29(+1) It is very difficult to find the language that delivers effective impact in sustainable development endeavors, especially with economy being the 'currency' for policy.

31(+3) Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders to foster communication.

40(+1) In Ireland, media catchwords on sustainability-related topics are too simple and misleading, and do not provide meaningful insights for sustainable development.

55(0) New protocols of communicating science need to be drawn up to address controversial scientific issues in cross-disciplinary fields.

Items Ranked Lower in Factor 3 Array than in Other Factor Arrays

04(-3) In Ireland, the major discourse of sustainable development is currently being dominated by 'the managerial outlook'.

20(0) There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably.

22(0) The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.

24(-3) Although individual contributions are fruitful in creating a sustainable environment; it is policy at the national or international level that's going to create real impacts.

32(-2) Not everyone in Ireland wants sustainability since people have different priorities.

34(-2) Framing sustainable development with economic arguments is much easier than accommodating complexities in science and technology.

39(-2) Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainable policies and operations.

42(-2) The Irish government often regards science and technology merely as an instrumental tool for drawing up sustainable development policies.

48(-3) Sustainable development should not be GDP development.

53(+1) There should be more education for the general public in Ireland regarding sustainable development.

Items ranked at -4

06(-4) Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.

51(-4) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

54(-4) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.

Items ranked at -5

28(-5) In Ireland, the challenge for carrying out sustainable development is that there is not enough time to sit down and discuss what the most important values should be for the society.

36(-5) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

Factor 4: #3; 1.11; 4%

Items ranked at +5

10(+5) Cleantech is an essential endeavor to achieve sustainability. The growth of Cleantech in Ireland will bring forth many opportunities, including energy, innovation, and 'green-collar' jobs.

43(+5) Sustainable development initiatives in Ireland are more effective when they are regulation-driven.

Items ranked at +4

14(+4) In Ireland, people don't like new things and they are afraid of changes. It is very hard to mobilize the public to act sustainably due to their 'defence mechanism', unless they receive 'benefits' in some forms.

30(+4) In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.

51(+4) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

Items Ranked Higher in Factor 4 Array than in Other Factor Arrays

06(0) Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.

07(+1) The complexity of sustainable development issues in Ireland makes communicating the concept of sustainable development difficult.

12(-1) By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.

13(+1) Scientific and technological debates often result in a polarized public: those who simply accept new technologies and trust the decisions made by 'experts', against those who are suspicious of innovations.

25(+1) In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.

33(0) In Ireland, there's a movement towards resilience and collective transitions in sustainable actions.

34(+3) Framing sustainable development with economic arguments is much easier than accommodating complexities in science and technology.

36(+2) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

37(+3) The Irish government is not communicating clearly and coherently to the people the priorities of sustainable development issues.

39(+3) Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainable policies and operations.

40(+1) In Ireland, media catchwords on sustainability-related topics are too simple and misleading, and do not provide meaningful insights for sustainable development.

41(+2) Ireland should shift the leadership focus from policy makers to market shapers, making sustainable marketing an open process.

42(0) The Irish government often regards science and technology merely as an instrumental tool for drawing up sustainable development policies.

Items Ranked Lower in Factor 4 Array than in Other Factor Arrays

01(-1) There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)

03(-2) Stakeholders have polarized views on solutions and practices in sustainable development in Ireland.

05(-2) In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.

11(-1) A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver.

15(0) In Ireland, to mobilize people into sustainable activities, motivational tools such as creating incentives, showing them how easy it could be done, or community initiatives could be useful.

17(-2) The NGOs sector in Ireland has a huge amount of expertise and knowledge to offer for sustainable development.

18(-3) Sustainable development is about value judgment, about how humans interact with the nature to address human needs.

21(-2) The sustainable development agenda in Ireland should represent all levels, including social partnership, local authorities and procurements.

22(0) The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.

23(0) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.

29(-2) It is very difficult to find the language that delivers effective impact in sustainable development endeavors, especially with economy being the 'currency' for policy.

31(-1) Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders to foster communication.

38(-2) Sustainable development models in Ireland should not remain merely top-down and expert-driven. Rather, a more inclusive and transparent process should be adopted.

48(-3) Sustainable development should not be GDP development.

49(+1) The challenge in the societal part of sustainable development is that we have to move a gigantic market from fossil fuel to alternatives. It is difficult to make people understand in a very short period of time that solutions are feasible.

55(-3) New protocols of communicating science need to be drawn up to address controversial scientific issues in cross-disciplinary fields.

Items ranked at -4

26(-4) In Ireland, social transparency or social equity are not present in sustainable development.

47(-4) Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.

54(-4) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.

Items ranked at -5

02(-5) Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches.

52(-5) The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.

Factor 5: #9, #15, #18, #20, #21; 1.21; 11%

Items ranked at +5

20(+5) There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably.

23(+5) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.

Items ranked at +4

19(+4) Ireland is wealthy in terms of resources, but as a developed country, the general public is immune to environmental impacts.

35(+4) People react to sustainable issues most relevant to them, for example green community/campus activities. They do not respond to the more abstract notion of sustainability.

47(+4) Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.

Items Ranked Higher in Factor 5 Array than in Other Factor Arrays

03(+1) Stakeholders have polarized views on solutions and practices in sustainable development in Ireland.

11(+1) A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver.

12(-1) By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.

13(+1) Scientific and technological debates often result in a polarized public: those who simply accept new technologies and trust the decisions made by 'experts', against those who are suspicious of innovations.

17(+3) The NGOs sector in Ireland has a huge amount of expertise and knowledge to offer for sustainable development.

22(+1) The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.

25(+1) In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.

27(+3) The term 'sustainability' or 'sustainable development' used by environmentalists, governments, politicians, industries and the business show very diverse visions.

32(+3) Not everyone in Ireland wants sustainability since people have different priorities.

54(-3) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.

55(0) New protocols of communicating science need to be drawn up to address controversial scientific issues in cross-disciplinary fields.

Items Ranked Lower in Factor 5 Array than in Other Factor Arrays

01(-1) There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)

05(-2) In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.

09(-3) Sustainable development can also be viewed as a scientific and technological endeavour. Science and technology are amongst the most effective means to enhance socio-economic development in Ireland.

10(-3) Cleantech is an essential endeavor to achieve sustainability. The growth of Cleantech in Ireland will bring forth many opportunities, including energy, innovation, and 'green-collar' jobs.

15(0) In Ireland, to mobilize people into sustainable activities, motivational tools such as creating incentives, showing them how easy it could be done, or community initiatives could be useful.

31(-1) Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders to foster communication.

34(-2) Framing sustainable development with economic arguments is much easier than accommodating complexities in science and technology.

50(-2) In Ireland, it is difficult for the industry to collaborate with the academic in large-scale sustainable development projects; rather, collaborations are mostly niches with specific goals.

Items ranked at -4

16(-4) It is easy to see the short-term effects on behavioral change regarding sustainability, but more difficult to monitor and evaluate effects on a longer term.

43(-4) Sustainable development initiatives in Ireland are more effective when they are regulation-driven.

51(-4) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

Items ranked at -5

06(-5) Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.

36(-5) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

Appendix J: Crib Sheets for Six-factor Solution

Factor 1: #5, #6, #10; 8%

Items ranked at +5

*11(+5) A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver.

*47(+5) Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.

Items ranked at +4

23(+4) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.

24(+4) Although individual contributions are fruitful in creating a sustainable environment; it is policy at the national or international level that's going to create real impacts.

48(+4) Sustainable development should not be GDP development.

Items Ranked Higher in Factor 1 Array than in Other Factor Arrays

01(+2) There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)

©22(+2) The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.

25(+1) In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.

26(+1) In Ireland, social transparency or social equity are not present in sustainable development.

29(+3) It is very difficult to find the language that delivers effective impact in sustainable development endeavors, especially with economy being the 'currency' for policy.

33(0) In Ireland, there's a movement towards resilience and collective transitions in sustainable actions.

©35(+3) People react to sustainable issues most relevant to them, for example green community/campus activities. They do not respond to the more abstract notion of sustainability.

40(+2) In Ireland, media catchwords on sustainability-related topics are too simple and misleading, and do not provide meaningful insights for sustainable development.

Items Ranked Lower in Factor 1 Array than in Other Factor Arrays

05(-2) In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.

07(-3) The complexity of sustainable development issues in Ireland makes communicating the concept of sustainable development difficult.

15(0) In Ireland, to mobilize people into sustainable activities, motivational tools such as creating incentives, showing them how easy it could be done, or community initiatives could be useful.

16(-3) It is easy to see the short-term effects on behavioral change regarding sustainability, but more difficult to monitor and evaluate effects on a longer term.

27(-1) The term 'sustainability' or 'sustainable development' used by environmentalists, governments, politicians, industries and the business show very diverse visions.

53(-1) There should be more education for the general public in Ireland regarding sustainable development.

Items ranked at -4

32(-4) Not everyone in Ireland wants sustainability since people have different priorities.

*39(-4) Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainable policies and operations.

52(-4) The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.

Items ranked at -5

51(-5) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

54(-5) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.

Factor 2: #4, #7, #14; 10%

Items ranked at +5

21(+5) The sustainable development agenda in Ireland should represent all levels, including social partnership, local authorities and procurements.

45(+5) One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders.

Items ranked at +4

31(+4) Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders to foster communication.

46(+4) In communication around sustainable development, it is essential to identify the 'champions', the ones who are enthusiastic in creating strategic opportunities and changes for Ireland.

53(+4) There should be more education for the general public in Ireland regarding sustainable development.

Items Ranked Higher in Factor 2 Array than in Other Factor Arrays

01(+2) There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)

05(+2) In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.

15(+3) In Ireland, to mobilize people into sustainable activities, motivational tools such as creating incentives, showing them how easy it could be done, or community initiatives could be useful.

16(+2) It is easy to see the short-term effects on behavioral change regarding sustainability, but more difficult to monitor and evaluate effects on a longer term.

17(+1) The NGOs sector in Ireland has a huge amount of expertise and knowledge to offer for sustainable development.

18(+3) Sustainable development is about value judgment, about how humans interact with the nature to address human needs.

22(0) The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.

27(+3) The term 'sustainability' or 'sustainable development' used by environmentalists, governments, politicians, industries and the business show very diverse visions.

33(0) In Ireland, there's a movement towards resilience and collective transitions in sustainable actions.

52(+2) The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.

54(-3) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.

Items Ranked Lower in Factor 2 Array than in Other Factor Arrays

03(-2) Stakeholders have polarized views on solutions and practices in sustainable development in Ireland.

08(-3) In the mainstream debate of sustainable development in Ireland, the societal definitions are often overlooked due to the dominance of the science paradigm.

11(-1) A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver.

12(-3) By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.

24(-2) Although individual contributions are fruitful in creating a sustainable environment; it is policy at the national or international level that's going to create real impacts.

25(-2) In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.

35(+1) People react to sustainable issues most relevant to them, for example green community/campus activities. They do not respond to the more abstract notion of sustainability.

37(0) The Irish government is not communicating clearly and coherently to the people the priorities of sustainable development issues.

40(-1) In Ireland, media catchwords on sustainability-related topics are too simple and misleading, and do not provide meaningful insights for sustainable development.

42(-3) The Irish government often regards science and technology merely as an instrumental tool for drawing up sustainable development policies.

50(-2) In Ireland, it is difficult for the industry to collaborate with the academic in large-scale sustainable development projects; rather, collaborations are mostly niches with specific goals.

Items ranked at -4

13(-4) Scientific and technological debates often result in a polarized public: those who simply accept new technologies and trust the decisions made by 'experts', against those who are suspicious of innovations.

14(-4) In Ireland, people don't like new things and they are afraid of changes. It is very hard to mobilize the public to act sustainably due to their 'defence mechanism', unless they receive 'benefits' in some forms.

19(-4) Ireland is wealthy in terms of resources, but as a developed country, the general public is immune to environmental impacts.

Items ranked at -5

28(-5) In Ireland, the challenge for carrying out sustainable development is that there is not enough time to sit down and discuss what the most important values should be for the society.

36(-5) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

Factor 3: #9, #13, #15, #18; 10%

Items ranked at +5

23(+5) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.

30(+5) In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.

Items ranked at +4

19(+4) Ireland is wealthy in terms of resources, but as a developed country, the general public is immune to environmental impacts.

20(+4) There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably.

45(+4) One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders.

Items Ranked Higher in Factor 3 Array than in Other Factor Arrays

07(+3) The complexity of sustainable development issues in Ireland makes communicating the concept of sustainable development difficult.

12(+1) By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.

25(+1) In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.

32(+3) Not everyone in Ireland wants sustainability since people have different priorities.

42(0) The Irish government often regards science and technology merely as an instrumental tool for drawing up sustainable development policies.

55(+1) New protocols of communicating science need to be drawn up to address controversial scientific issues in cross-disciplinary fields.

Items Ranked Lower in Factor 3 Array than in Other Factor Arrays

09(-2) Sustainable development can also be viewed as a scientific and technological endeavour. Science and technology are amongst the most effective means to enhance socio-economic development in Ireland.

10(-2) Cleantech is an essential endeavor to achieve sustainability. The growth of Cleantech in Ireland will bring forth many opportunities, including energy, innovation, and 'green-collar' jobs.

16(-3) It is easy to see the short-term effects on behavioral change regarding sustainability, but more difficult to monitor and evaluate effects on a longer term.

22(0) The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.

24(-2) Although individual contributions are fruitful in creating a sustainable environment; it is policy at the national or international level that's going to create real impacts.

33(-3) In Ireland, there's a movement towards resilience and collective transitions in sustainable actions.

40(-1) In Ireland, media catchwords on sustainability-related topics are too simple and misleading, and do not provide meaningful insights for sustainable development.

49(-1) The challenge in the societal part of sustainable development is that we have to move a gigantic market from fossil fuel to alternatives. It is difficult to make people understand in a very short period of time that solutions are feasible.

50(-2) In Ireland, it is difficult for the industry to collaborate with the academic in large-scale sustainable development projects; rather, collaborations are mostly niches with specific goals.

Items ranked at -4

36(-4) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

43(-4) Sustainable development initiatives in Ireland are more effective when they are regulation-driven.

51(-4) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

Items ranked at -5

06(-5) Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.

54(-5) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.

Factor 4: #11, #12, #16, #20, #24; 10%

Items ranked at +5

20(+5) There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably.

23(+5) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.

Items ranked at +4

28(+4) In Ireland, the challenge for carrying out sustainable development is that there is not enough time to sit down and discuss what the most important values should be for the society.

47(+4) Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.

49(+4) The challenge in the societal part of sustainable development is that we have to move a gigantic market from fossil fuel to alternatives. It is difficult to make people understand in a very short period of time that solutions are feasible.

Items Ranked Higher in Factor 4 Array than in Other Factor Arrays

01(+2) There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)

03(+1) Stakeholders have polarized views on solutions and practices in sustainable development in Ireland.

04(+1) In Ireland, the major discourse of sustainable development is currently being dominated by 'the managerial outlook'.

05(+2) In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.

08(+2) In the mainstream debate of sustainable development in Ireland, the societal definitions are often overlooked due to the dominance of the science paradigm.

09(+1) Sustainable development can also be viewed as a scientific and technological endeavour. Science and technology are amongst the most effective means to enhance socio-economic development in Ireland.

13(+2) Scientific and technological debates often result in a polarized public: those who simply accept new technologies and trust the decisions made by 'experts', against those who are suspicious of innovations.

15(+3) In Ireland, to mobilize people into sustainable activities, motivational tools such as creating incentives, showing them how easy it could be done, or community initiatives could be useful.

50(0) In Ireland, it is difficult for the industry to collaborate with the academic in large-scale sustainable development projects; rather, collaborations are mostly niches with specific goals.

Items Ranked Lower in Factor 4 Array than in Other Factor Arrays

12(-3) By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.

22(0) The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.

30(-2) In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.

35(+1) People react to sustainable issues most relevant to them, for example green community/campus activities. They do not respond to the more abstract notion of sustainability.

41(-3) Ireland should shift the leadership focus from policy makers to market shapers, making sustainable marketing an open process.

44(-2) The environmental and economic pillars in sustainable development are very disconnected at this moment in Ireland - the overlapping parts are missing, even more missing than it has been in the past.

45(-1) One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders.

46(-1) In communication around sustainable development, it is essential to identify the 'champions', the ones who are enthusiastic in creating strategic opportunities and changes for Ireland.

Items ranked at -4

06(-4) Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.

52(-4) The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.

54(-4) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.

Items ranked at -5

36(-5) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

51(-5) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

Factor 5: #1, #8, #17, #27; 10%

Items ranked at +5

31(+5) Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders to foster communication.

38(+5) Sustainable development models in Ireland should not remain merely top-down and expert-driven. Rather, a more inclusive and transparent process should be adopted.

Items ranked at +4

30(+4) In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.

44(+4) The environmental and economic pillars in sustainable development are very disconnected at this moment in Ireland - the overlapping parts are missing, even more missing than it has been in the past.

45(+4) One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders.

Items Ranked Higher in Factor 5 Array than in Other Factor Arrays

01(+2) There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)

02(+3) Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches.

13(+2) Scientific and technological debates often result in a polarized public: those who simply accept new technologies and trust the decisions made by 'experts', against those who are suspicious of innovations.

25(+1) In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.

33(0) In Ireland, there's a movement towards resilience and collective transitions in sustainable actions.

35(+1) People react to sustainable issues most relevant to them, for example green community/campus activities. They do not respond to the more abstract notion of sustainability.

Items Ranked Lower in Factor 5 Array than in Other Factor Arrays

04(-3) In Ireland, the major discourse of sustainable development is currently being dominated by 'the managerial outlook'.

20(0) There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably.

34(-3) Framing sustainable development with economic arguments is much easier than accommodating complexities in science and technology.

Items ranked at -4

28(-4) In Ireland, the challenge for carrying out sustainable development is that there is not enough time to sit down and discuss what the most important values should be for the society.

48(-4) Sustainable development should not be GDP development.

54(-4) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.

Items ranked at -5

36(-5) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

51(-5) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

Factor 6: #3; 5%

Items ranked at +5

10(+5) Cleantech is an essential endeavor to achieve sustainability. The growth of Cleantech in Ireland will bring forth many opportunities, including energy, innovation, and 'green-collar' jobs.

43(+5) Sustainable development initiatives in Ireland are more effective when they are regulation-driven.

Items ranked at +4

14(+4) In Ireland, people don't like new things and they are afraid of changes. It is very hard to mobilize the public to act sustainably due to their 'defence mechanism', unless they receive 'benefits' in some forms.

30(+4) In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.

51(+4) Everything else would fall through successfully once the economic dimension in sustainable development is achieved.

Items Ranked Higher in Factor 6 Array than in Other Factor Arrays

06(0) Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.

25(+1) In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.

33(0) In Ireland, there's a movement towards resilience and collective transitions in sustainable actions.

34(+3) Framing sustainable development with economic arguments is much easier than accommodating complexities in science and technology.

36(+2) Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.

37(+3) The Irish government is not communicating clearly and coherently to the people the priorities of sustainable development issues.

39(+3) Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainable policies and operations.

41(+2) Ireland should shift the leadership focus from policy makers to market shapers, making sustainable marketing an open process.

42(0) The Irish government often regards science and technology merely as an instrumental tool for drawing up sustainable development policies.

Items Ranked Lower in Factor 6 Array than in Other Factor Arrays

01(-1) There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)

03(-2) Stakeholders have polarized views on solutions and practices in sustainable development in Ireland.

05(-2) In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.

08(-3) In the mainstream debate of sustainable development in Ireland, the societal definitions are often overlooked due to the dominance of the science paradigm.

11(-1) A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver.

15(0) In Ireland, to mobilize people into sustainable activities, motivational tools such as creating incentives, showing them how easy it could be done, or community initiatives could be useful.

17(-2) The NGOs sector in Ireland has a huge amount of expertise and knowledge to offer for sustainable development.

18(-3) Sustainable development is about value judgment, about how humans interact with the nature to address human needs.

21(-2) The sustainable development agenda in Ireland should represent all levels, including social partnership, local authorities and procurements.

22(0) The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.

23(0) The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.

29(-2) It is very difficult to find the language that delivers effective impact in sustainable development endeavors, especially with economy being the 'currency' for policy.

31(-1) Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders to foster communication.

38(-2) Sustainable development models in Ireland should not remain merely top-down and expert-driven. Rather, a more inclusive and transparent process should be adopted.

55(-3) New protocols of communicating science need to be drawn up to address controversial scientific issues in cross-disciplinary fields.

Items ranked at -4

26(-4) In Ireland, social transparency or social equity are not present in sustainable development.

47(-4) Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.

54(-4) It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.

Items ranked at -5

02(-5) Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches.

52(-5) The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.

Appendix K: Factor Analysis Data

Statements	1	2	3	4
1 There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)	3	4	3	0
2 Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches.	1	1	4	1
3 Stakeholders have polarized views on solutions and practices in sustainable development in Ireland.	0	-1	-2	0
4 In Ireland, the major discourse of sustainable development is currently being dominated by 'the managerial outlook'.	1	-2	0	-2
5 In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.	1	1	2	0
6 Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.	-4	-3	-4	-5
7 The complexity of sustainable development issues in Ireland makes communicating the concept of sustainable development difficult.	-3	-1	-3	1
8 In the mainstream debate of sustainable development in Ireland, the societal definitions are often overlooked due to the dominance of the science paradigm.	2	-4	1	-1
9 Sustainable development can also be viewed as a scientific and technological endeavour. Science and technology are amongst the most effective means to enhance socio-economic development in Ireland.	1	-2	-2	-1
10 Cleantech is an essential endeavor to achieve sustainability. The growth of Cleantech in Ireland will bring forth many opportunities, including energy, innovation, and 'green-collar' jobs.	3	0	-4	1
11 A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver.	2	0	0	0
12 By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.	-3	-2	1	0
13 Scientific and technological debates often result in a polarized public: those who simply accept new technologies and trust the decisions made by 'experts', against those who are suspicious of innovations.	2	-2	1	-1
14 In Ireland, people don't like new things and they are afraid of changes. It is very hard to mobilize the public to act sustainably due to their 'defence mechanism', unless they receive 'benefits' in some forms.	-2	-4	-1	2
15 In Ireland, to mobilize people into sustainable activities, motivational tools such as creating incentives, showing them how easy it could be done, or community initiatives could be useful.	3	3	1	4
16 It is easy to see the short-term effects on behavioral change regarding sustainability, but more difficult to monitor and evaluate effects on a longer term.	-3	2	3	-2
17 The NGOs sector in Ireland has a huge amount of expertise and knowledge to offer for sustainable development.	-1	0	2	1
18 Sustainable development is about value judgment, about how humans interact with the nature to address human needs.	0	2	1	-3
19 Ireland is wealthy in terms of resources, but as a developed country, the general public is immune to environmental impacts.	-2	-5	0	0
20 There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably.	5	3	-1	4
21 The sustainable development agenda in Ireland should represent all levels, including social partnership, local authorities and procurements.	-1	4	0	2
22 The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.	0	0	2	0
23 The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.	5	1	1	5

24 Although individual contributions are fruitful in creating a sustainable environment; it is policy at the national or international level that's going to create real impacts.	**4**	**0**	**-4**	**-3**
25 In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.	**0**	**-1**	**-1**	**1**
26 In Ireland, social transparency or social equity are not present in sustainable development.	**0**	**-1**	**4**	**-2**
27 The term 'sustainability' or 'sustainable development' used by environmentalists, governments, politicians, industries and the business show very diverse visions.	**0**	**2**	**1**	**1**
28 In Ireland, the challenge for carrying out sustainable development is that there is not enough time to sit down and discuss what the most important values should be for the society.	**4**	**-3**	**-3**	**-4**
29 It is very difficult to find the language that delivers effective impact in sustainable development endeavors, especially with economy being the 'currency' for policy.	**-1**	**0**	**0**	**1**
30 In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.	**-1**	**0**	**-1**	**5**
31 Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders to foster communication.	**0**	**3**	**3**	**2**
32 Not everyone in Ireland wants sustainability since people have different priorities.	**1**	**1**	**-1**	**-1**
33 In Ireland, there's a movement towards resilience and collective transitions in sustainable actions.	**-2**	**-1**	**-2**	**-3**
34 Framing sustainable development with economic arguments is much easier than accommodating complexities in science and technology.	**0**	**1**	**-2**	**-2**
35 People react to sustainable issues most relevant to them, for example green community/campus activities. They do not respond to the more abstract notion of sustainability.	**1**	**2**	**0**	**2**
36 Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.	**-4**	**-4**	**1**	**-5**
37 The Irish government is not communicating clearly and coherently to the people the priorities of sustainable development issues.	**2**	**1**	**-1**	**2**
38 Sustainable development models in Ireland should not remain merely top-down and expert-driven. Rather, a more inclusive and transparent process should be adopted.	**1**	**2**	**5**	**3**
39 Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainable policies and operations.	**-2**	**-2**	**-3**	**-2**
40 In Ireland, media catchwords on sustainability-related topics are too simple and misleading, and do not provide meaningful insights for sustainable development.	**1**	**-1**	**-2**	**0**
41 Ireland should shift the leadership focus from policy makers to market shapers, making sustainable marketing an open process.	**-3**	**-1**	**-3**	**-2**
42 The Irish government often regards science and technology merely as an instrumental tool for drawing up sustainable development policies.	**-1**	**-3**	**-2**	**-1**
43 Sustainable development initiatives in Ireland are more effective when they are regulation-driven.	**-2**	**0**	**-5**	**-3**
44 The environmental and economic pillars in sustainable development are very disconnected at this moment in Ireland - the overlapping parts are missing, even more missing than it has been in the past.	**-2**	**0**	**2**	**3**
45 One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders.	**0**	**5**	**3**	**4**
46 In communication around sustainable development, it is essential to identify the 'champions', the ones who are enthusiastic in creating strategic opportunities and changes for Ireland.	**-1**	**2**	**0**	**2**
47 Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.	**4**	**1**	**4**	**3**
48 Sustainable development should not be GDP development.	**2**	**4**	**0**	**-1**

49 The challenge in the societal part of sustainable development is that we have to move a gigantic market from fossil fuel to alternatives. It is difficult to make people understand in a very short period of time that solutions are feasible.	**3**	**1**	**-1**	**1**
50 In Ireland, it is difficult for the industry to collaborate with the academic in large-scale sustainable development projects; rather, collaborations are mostly niches with specific goals.	**-1**	**-2**	**0**	**-1**
51 Everything else would fall through successfully once the economic dimension in sustainable development is achieved.	**-5**	**-3**	**-5**	**-4**
52 The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.	**-4**	**3**	**5**	**-1**
53 There should be more education for the general public in Ireland regarding sustainable development.	**2**	**5**	**-1**	**3**
54 It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.	**-5**	**-5**	**2**	**-4**
55 New protocols of communicating science need to be drawn up to address controversial scientific issues in cross-disciplinary fields.	**-1**	**-1**	**2**	**0**

Table K.1 Factor scores for four-factor solution

Statements	**1**	**2**	**3**	**4**	**5**
1 There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)	**3**	**3**	**2**	**-1**	**-1**
2 Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches.	**1**	**0**	**3**	**-5**	**0**
3 Stakeholders have polarized views on solutions and practices in sustainable development in Ireland.	**0**	**-1**	**0**	**-2**	**1**
4 In Ireland, the major discourse of sustainable development is currently being dominated by 'the managerial outlook'.	**1**	**-1**	**-3**	**0**	**-1**
5 In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.	**1**	**1**	**1**	**-2**	**-2**
6 Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.	**-4**	**-3**	**-4**	**0**	**-5**
7 The complexity of sustainable development issues in Ireland makes communicating the concept of sustainable development difficult.	**-2**	**-1**	**0**	**1**	**0**
8 In the mainstream debate of sustainable development in Ireland, the societal definitions are often overlooked due to the dominance of the science paradigm.	**2**	**-4**	**-1**	**-3**	**-2**
9 Sustainable development can also be viewed as a scientific and technological endeavour. Science and technology are amongst the most effective means to enhance socio-economic development in Ireland.	**2**	**-2**	**-1**	**0**	**-3**
10 Cleantech is an essential endeavor to achieve sustainability. The growth of Cleantech in Ireland will bring forth many opportunities, including energy, innovation, and 'green-collar' jobs.	**4**	**0**	**1**	**5**	**-3**
11 A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver.	**1**	**0**	**0**	**-1**	**1**
12 By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.	**-3**	**-3**	**-1**	**-1**	**-1**
13 Scientific and technological debates often result in a polarized public: those who simply accept new technologies	**1**	**-3**	**-1**	**1**	**1**

and trust the decisions made by 'experts', against those who are suspicious of innovations.					
14 In Ireland, people don't like new things and they are afraid of changes. It is very hard to mobilize the public to act sustainably due to their 'defence mechanism', unless they receive 'benefits' in some forms.	**-2**	**-4**	**2**	**4**	**2**
15 In Ireland, to mobilize people into sustainable activities, motivational tools such as creating incentives, showing them how easy it could be done, or community initiatives could be useful.	**3**	**2**	**3**	**0**	**0**
16 It is easy to see the short-term effects on behavioral change regarding sustainability, but more difficult to monitor and evaluate effects on a longer term.	**-3**	**3**	**-1**	**0**	**-4**
17 The NGOs sector in Ireland has a huge amount of expertise and knowledge to offer for sustainable development.	**-1**	**0**	**2**	**-2**	**3**
18 Sustainable development is about value judgment, about how humans interact with the nature to address human needs.	**0**	**4**	**-2**	**-3**	**-1**
19 Ireland is wealthy in terms of resources, but as a developed country, the general public is immune to environmental impacts.	**-3**	**-4**	**0**	**-1**	**4**
20 There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably.	**4**	**3**	**0**	**1**	**5**
21 The sustainable development agenda in Ireland should represent all levels, including social partnership, local authorities and procurements.	**-1**	**4**	**1**	**-2**	**1**
22 The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.	**1**	**1**	**0**	**0**	**1**
23 The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.	**5**	**1**	**4**	**0**	**5**
24 Although individual contributions are fruitful in creating a sustainable environment; it is policy at the national or international level that's going to create real impacts.	**4**	**0**	**-3**	**2**	**0**
25 In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.	**0**	**-2**	**0**	**1**	**1**
26 In Ireland, social transparency or social equity are not present in sustainable development.	**0**	**-1**	**0**	**-4**	**-3**
27 The term 'sustainability' or 'sustainable development' used by environmentalists, governments, politicians, industries and the business show very diverse visions.	**0**	**2**	**1**	**1**	**3**
28 In Ireland, the challenge for carrying out sustainable development is that there is not enough time to sit down and discuss what the most important values should be for the society.	**3**	**-3**	**-5**	**-1**	**-2**
29 It is very difficult to find the language that delivers effective impact in sustainable development endeavors, especially with economy being the 'currency' for policy.	**-1**	**0**	**1**	**-2**	**0**
30 In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.	**-1**	**0**	**5**	**4**	**2**
31 Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders to foster communication.	**0**	**2**	**3**	**-1**	**-1**
32 Not everyone in Ireland wants sustainability since people have different priorities.	**1**	**1**	**-2**	**1**	**3**
33 In Ireland, there's a movement towards resilience and collective transitions in sustainable actions.	**-2**	**-1**	**-1**	**0**	**-1**

34 Framing sustainable development with economic arguments is much easier than accommodating complexities in science and technology.	**0**	**1**	**-2**	**3**	**-2**
35 People react to sustainable issues most relevant to them, for example green community/campus activities. They do not respond to the more abstract notion of sustainability.	**0**	**2**	**1**	**2**	**4**
36 Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.	**-4**	**-5**	**-5**	**2**	**-5**
37 The Irish government is not communicating clearly and coherently to the people the priorities of sustainable development issues.	**2**	**1**	**2**	**3**	**2**
38 Sustainable development models in Ireland should not remain merely top-down and expert-driven. Rather, a more inclusive and transparent process should be adopted.	**2**	**2**	**4**	**-2**	**1**
39 Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainable policies and operations.	**-2**	**-2**	**-2**	**3**	**-1**
40 In Ireland, media catchwords on sustainability-related topics are too simple and misleading, and do not provide meaningful insights for sustainable development.	**1**	**-1**	**1**	**1**	**0**
41 Ireland should shift the leadership focus from policy makers to market shapers, making sustainable marketing an open process.	**-3**	**0**	**-2**	**2**	**-2**
42 The Irish government often regards science and technology merely as an instrumental tool for drawing up sustainable development policies.	**-1**	**-2**	**-2**	**0**	**-1**
43 Sustainable development initiatives in Ireland are more effective when they are regulation-driven.	**-2**	**0**	**-3**	**5**	**-4**
44 The environmental and economic pillars in sustainable development are very disconnected at this moment in Ireland - the overlapping parts are missing, even more missing than it has been in the past.	**-2**	**-1**	**5**	**-1**	**1**
45 One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders.	**-1**	**5**	**3**	**2**	**2**
46 In communication around sustainable development, it is essential to identify the 'champions', the ones who are enthusiastic in creating strategic opportunities and changes for Ireland.	**-1**	**1**	**4**	**3**	**0**
47 Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.	**5**	**2**	**2**	**-4**	**4**
48 Sustainable development should not be GDP development.	**2**	**4**	**-3**	**-3**	**2**
49 The challenge in the societal part of sustainable development is that we have to move a gigantic market from fossil fuel to alternatives. It is difficult to make people understand in a very short period of time that solutions are feasible.	**3**	**1**	**2**	**1**	**2**
50 In Ireland, it is difficult for the industry to collaborate with the academic in large-scale sustainable development projects; rather, collaborations are mostly niches with specific goals.	**0**	**-2**	**-1**	**-1**	**-2**
51 Everything else would fall through successfully once the economic dimension in sustainable development is achieved.	**-5**	**-2**	**-4**	**4**	**-4**
52 The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.	**-4**	**3**	**-1**	**-5**	**0**
53 There should be more education for the general public in Ireland regarding sustainable development.	**2**	**5**	**1**	**2**	**3**

54 It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.	**-5**	**-5**	**-4**	**-4**	**-3**
55 New protocols of communicating science need to be drawn up to address controversial scientific issues in cross-disciplinary fields.	**-1**	**-1**	**0**	**-3**	**0**

Table K.2 Factor scores for five-factor solution

Statements	**1**	**2**	**3**	**4**	**5**	**6**
1 There should be dialogues between stakeholders to tackle challenges of wicked problems* in sustainable development. (*wicked problems are problems where there are complexities in multiple causes, consequences, with multi-actors)	**2**	**2**	**0**	**2**	**2**	**-1**
2 Ireland neglects to take into account a holistic overview of the three pillars (environmental, economic and societal) in sustainable development approaches.	**-2**	**1**	**-2**	**2**	**3**	**-5**
3 Stakeholders have polarized views on solutions and practices in sustainable development in Ireland.	**-1**	**-2**	**0**	**1**	**-1**	**-2**
4 In Ireland, the major discourse of sustainable development is currently being dominated by 'the managerial outlook'.	**0**	**0**	**0**	**1**	**-3**	**0**
5 In Ireland, the effectiveness and impact of stakeholder communication in sustainable development needs to be investigated and evaluated.	**-2**	**2**	**-1**	**2**	**0**	**-2**
6 Sustainable development is the latest trend in Ireland. It is becoming embedded in people's psyche and actions in everyday life.	**-2**	**-2**	**-5**	**-4**	**-3**	**0**
7 The complexity of sustainable development issues in Ireland makes communicating the concept of sustainable development difficult.	**-3**	**-2**	**3**	**-2**	**-1**	**1**
8 In the mainstream debate of sustainable development in Ireland, the societal definitions are often overlooked due to the dominance of the science paradigm.	**-2**	**-3**	**-1**	**2**	**1**	**-3**
9 Sustainable development can also be viewed as a scientific and technological endeavour. Science and technology are amongst the most effective means to enhance socio-economic development in Ireland.	**-1**	**-1**	**-2**	**1**	**-1**	**0**
10 Cleantech is an essential endeavor to achieve sustainability. The growth of Cleantech in Ireland will bring forth many opportunities, including energy, innovation, and 'green-collar' jobs.	**1**	**-1**	**-2**	**3**	**2**	**5**
11 A lot of Irish organizations/corporations are using sustainability for 'green washing'. Even though they are doing something to help the environment, sustainability is not the main driver.	**5**	**-1**	**0**	**0**	**1**	**-1**
12 By engaging people initially on an individual level in sustainable development, engaging people on a collective level would follow easily.	**-2**	**-3**	**1**	**-3**	**-2**	**-1**
13 Scientific and technological debates often result in a polarized public: those who simply accept new technologies and trust the decisions made by 'experts', against those who are suspicious of innovations.	**-1**	**-4**	**-1**	**2**	**2**	**1**
14 In Ireland, people don't like new things and they are afraid of changes. It is very hard to mobilize the public to act sustainably due to their 'defence mechanism', unless they receive 'benefits' in some forms.	**1**	**-4**	**3**	**-3**	**1**	**4**
15 In Ireland, to mobilize people into sustainable activities, motivational tools such as creating incentives, showing them how easy it could be done, or community initiatives could be useful.	**0**	**3**	**1**	**3**	**2**	**0**
16 It is easy to see the short-term effects on behavioral change regarding sustainability, but more difficult to monitor and evaluate effects on a longer term.	**-3**	**2**	**-3**	**-2**	**-2**	**0**

17 The NGOs sector in Ireland has a huge amount of expertise and knowledge to offer for sustainable development.	**0**	**1**	**0**	**-1**	**0**	**-2**
18 Sustainable development is about value judgment, about how humans interact with the nature to address human needs.	**2**	**3**	**-1**	**0**	**-2**	**-3**
19 Ireland is wealthy in terms of resources, but as a developed country, the general public is immune to environmental impacts.	**1**	**-4**	**4**	**-3**	**-3**	**-1**
20 There is a huge gap between sustainable attitudes/awareness and behaviors. That is, people are aware of sustainable issues but often fail to act sustainably.	**2**	**1**	**4**	**5**	**0**	**1**
21 The sustainable development agenda in Ireland should represent all levels, including social partnership, local authorities and procurements.	**0**	**5**	**2**	**0**	**1**	**-2**
22 The Irish policy efforts in the environmental pillar is more reactive than proactive due to limited resources, and thus often result in merely responding passively to global strategies such as Rio 20+.	**2**	**0**	**0**	**0**	**1**	**0**
23 The Irish society has not yet developed a 'social taboo' for destructive consumption. That is, people are aware of sustainable lifestyles, but there is a lack of value and consensus towards making sustainable living a priority.	**4**	**1**	**5**	**5**	**3**	**0**
24 Although individual contributions are fruitful in creating a sustainable environment; it is policy at the national or international level that's going to create real impacts.	**4**	**-2**	**-2**	**3**	**-1**	**2**
25 In Ireland, pushing for environmental bills and policies requires tremendous effort in the public consultation process.	**1**	**-2**	**1**	**-1**	**1**	**1**
26 In Ireland, social transparency or social equity are not present in sustainable development.	**1**	**-1**	**-3**	**0**	**0**	**-4**
27 The term 'sustainability' or 'sustainable development' used by environmentalists, governments, politicians, industries and the business show very diverse visions.	**-1**	**3**	**2**	**1**	**0**	**1**
28 In Ireland, the challenge for carrying out sustainable development is that there is not enough time to sit down and discuss what the most important values should be for the society.	**-3**	**-5**	**-3**	**4**	**-4**	**-1**
29 It is very difficult to find the language that delivers effective impact in sustainable development endeavors, especially with economy being the 'currency' for policy.	**3**	**0**	**1**	**-1**	**0**	**-2**
30 In communicating about sustainable development, there's a challenge in making a proposition that's really concrete, and selling it really persuasively and successfully.	**1**	**0**	**5**	**-2**	**4**	**4**
31 Successful implementation of sustainable development policies and objectives require collaboration across a range of agencies and stakeholders to foster communication.	**0**	**4**	**0**	**0**	**5**	**-1**
32 Not everyone in Ireland wants sustainability since people have different priorities.	**-4**	**0**	**3**	**3**	**-2**	**1**
33 In Ireland, there's a movement towards resilience and collective transitions in sustainable actions.	**0**	**0**	**-3**	**-2**	**0**	**0**
34 Framing sustainable development with economic arguments is much easier than accommodating complexities in science and technology.	**0**	**1**	**-2**	**0**	**-3**	**3**
35 People react to sustainable issues most relevant to them, for example green community/campus activities. They do not respond to the more abstract notion of sustainability.	**3**	**1**	**2**	**1**	**1**	**2**

36 Despite the attempts to integrate the three pillars (economic, environmental and social) in sustainable development, they are only compatible in theory and not in practice.	**-3**	**-5**	**-4**	**-5**	**-5**	**2**
37 The Irish government is not communicating clearly and coherently to the people the priorities of sustainable development issues.	**1**	**0**	**2**	**1**	**2**	**3**
38 Sustainable development models in Ireland should not remain merely top-down and expert-driven. Rather, a more inclusive and transparent process should be adopted.	**0**	**2**	**3**	**1**	**5**	**-2**
39 Irish industries are keen to have their voices heard in discussions of sustainable development issues, especially in demonstrating their commitment to sustainable policies and operations.	**-4**	**-1**	**0**	**-1**	**-2**	**-3**
40 In Ireland, media catchwords on sustainability-related topics are too simple and misleading, and do not provide meaningful insights for sustainable development.	**2**	**-1**	**-1**	**0**	**0**	**1**
41 Ireland should shift the leadership focus from policy makers to market shapers, making sustainable marketing an open process.	**-2**	**0**	**-1**	**-3**	**-2**	**2**
42 The Irish government often regards science and technology merely as an instrumental tool for drawing up sustainable development policies.	**-2**	**-3**	**0**	**-1**	**-1**	**0**
43 Sustainable development initiatives in Ireland are more effective when they are regulation-driven.	**0**	**1**	**-4**	**-2**	**-1**	**5**
44 The environmental and economic pillars in sustainable development are very disconnected at this moment in Ireland - the overlapping parts are missing, even more missing than it has been in the past.	**2**	**0**	**1**	**-2**	**4**	**-1**
45 One of the biggest challenges in communicating sustainability is the translation of concepts into practices, with a clear understanding of the implications for a range of stakeholders.	**1**	**5**	**4**	**-1**	**4**	**2**
46 In communication around sustainable development, it is essential to identify the 'champions', the ones who are enthusiastic in creating strategic opportunities and changes for Ireland.	**3**	**4**	**1**	**-1**	**3**	**3**
47 Ireland is not working out how its economy can serve in a sustainable fashion. The conversations are only about 'getting back to growth'.	**5**	**2**	**2**	**4**	**3**	**-4**
48 Sustainable development should not be GDP development.	**4**	**3**	**-1**	**1**	**-4**	**-3**
49 The challenge in the societal part of sustainable development is that we have to move a gigantic market from fossil fuel to alternatives. It is difficult to make people understand in a very short period of time that solutions are feasible.	**3**	**1**	**-1**	**4**	**1**	**1**
50 In Ireland, it is difficult for the industry to collaborate with the academic in large-scale sustainable development projects; rather, collaborations are mostly niches with specific goals.	**-1**	**-2**	**-2**	**0**	**-1**	**-1**
51 Everything else would fall through successfully once the economic dimension in sustainable development is achieved.	**-5**	**-1**	**-4**	**-5**	**-5**	**4**
52 The ideal communication model in sustainable development would be treating both the experts and citizens equally, as opposed to the exclusive, 'expert-driven' framework of decision-making process.	**-4**	**2**	**1**	**-4**	**-1**	**-5**
53 There should be more education for the general public in Ireland regarding sustainable development.	**-1**	**4**	**2**	**2**	**2**	**2**

54 It is not effective to create incentives for those who are not interested in sustainable development issues; rather, the focus should be on those who are interested.	**-5**	**-3**	**-5**	**-4**	**-4**	**-4**
55 New protocols of communicating science need to be drawn up to address controversial scientific issues in cross-disciplinary fields.	**-1**	**-1**	**1**	**-1**	**0**	**-3**

Table K.3 Factor scores for six-factor solution